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A BUSINESS ORGANIZATION.

A business organization should be conceived of as a real standing together of a company of brothers to take care of each other and enjoy a portion of their lives together.—Edward D. Jones.

Publicity and Independent Emblems.

"One thing that impressed me," said a well known Independent telephone man in referring to a recent automobile trip through several of the states west of the Mississippi River, "was the scarcity of signs indicating Independent telephone service. As you know, those states have a great many Independent exchanges but I found it necessary to inquire as to locations of exchanges and pay stations in order to telephone.

There were, it is true, some Independent Shields as a symbol of service, but they were not distinctive. The paint and enamel had worn off and become dull so that the signs were not easily visible to the eye. This condition is not confined to the states mentioned, for I have noticed it in many other parts of the country."

Telephone companies are becoming more and more interested in advertising and publicity. The designation of exchanges and stations from which service may be obtained is a highly important feature of advertising and publicity. For some time the Independent Shield was featured and people became familiar with it. But the Shields have been allowed to deteriorate. They no longer are numerous in cities in which Independent companies operate. Those that are still in place are not bright and do not attract attention. The public has forgotten them and what they stand for, just as the name of the candidate for vice-president on the Republican ticket in 1912 can no longer be recalled by the great majority of people. Yet less than three years ago his name and features were familiar to people all over the country! To be effective, the emblem must be kept constantly before the public.

The Shield has not, it is contended by many, been a satisfactory emblem. A satisfactory emblem of Independent telephony is needed not only for signs indicating stations where telephone service may be obtained but also for use in advertisements, circulars, letter heads, etc. Look over the newspaper advertisements of Independent telephone companies to see how many carry an Independent emblem. Few will be found. An emblem used in connection with an advertisement serves the same purpose that a trade-mark does. "57 varieties" is never associated with a name other than Heinz. In the same way an emblem, well advertised, will come to mean "Independent telephone service."

Some companies have endeavored to use the Shield emblem. The designs have varied more or less, however, and the interest in them has gradually decreased, so that in many places the Shield is now an unimportant emblem.

With the great revival in Independent telephony which is under way, now would be a good time for an emblem to be selected. The state associations could offer prizes for designs to be submitted at their conventions. The best designs could then be placed on exhibition at the national conventions and thus a national emblem secured.

The competitions for prizes at the state conventions need not be limited, necessarily, to the residents of the particular state. Possibly the national associations would aid, the secretaries calling for designs and submitting them at the various conventions.

As to distributing the emblems or signs, the supply houses and manufacturers undoubtedly would instruct their salesmen, as they call upon the various companies, to boost the use of emblems. The national associations could make arrangements to supply the emblems at cost prices, while the sales campaign would be carried out by the manufacturers.

A co-operative action by state and national associations and manufacturers and supply men could not fail to produce results. An emblem of Independent telephony would again become a familiar symbol to the public.

The Three Keys

By HERBERT KAUFMAN

Every brain can't be brilliant. Neither studiousness nor steadiness will imbue a matter-of-fact mind with imagination or originality. A diamond in the rough doesn't sparkle and glow; it must be cut and polished before it will display its unique splendor under light. But the same process of preparation will not induce equal fire in an inferior gem.

Mental agility is seldom acquired; it's a birthright—a natal endowment. Men are born with the sense of humor, the "gift of gab" and the strain of subtlety. Inventors are not products of rules and schools, but their founders.

Don't yearn for that which you cannot earn or learn. The world's work, fortunately, is so great, there are so many divisions of labor, so many types of responsibilities, so many sorts of tasks, that there is always a position of dignity for every man who seeks to establish his fitness. The opportunities for success are as multiform as the variations of human nature.

Civilization works with an enormous tool kit. Progress requires thousands of different minds for her myriads of undertakings. The social machinery is an involved piece of mechanism with untold parts—all sorts of cogs and wheels and belts and pulleys and shafts and cams. If we were all alike, it would be impossible to transact the multitudinous affairs of this teaming, scheming universe.

We have need of careful, deliberate, calculating personalities, as well as schemers and dreamers. We require the matter-of-fact placid plodder far oftener than the captain of adventures. Conservation balances speculation. The apt-fingered must execute the plans of the swift-thinking.

But no matter what or who you are, where you work, or how you strive, failure in some form is inevitable, unless you possess certain essential qualifications. Ability is futile without stability.

As old Cyrus Simmons used to say:

"My son, there are three keys to success. Lose them and you'll find the world's doors locked in your face. You can't go far and you won't last long without discretion, fidelity and steadfastness. I've watched men rise and fall for 60 years, and I never saw a traitor prosper—a bobbler stick—nor a half-measure man endure. Keep faith, keep your mouth shut, keep at it, and you'll always be sure of your bed and board.

"Everybody has to sell something to exist—time, labor, ideas, money, goods or chattels. When you put a price on your word, or divulge confidential matters, or quit a job half-done—you're a marked and a marked-down proposition.

"Talent is like an unbroken colt—useless until it stays in the traces. I'd rather drive a safe, willing draught horse than trust to a tricky thoroughbred."

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Design, Construction, Testing of Duplex Cable for Loading

Problems Encountered in Design and Construction of Quadded Cable for Loaded Circuits—Uniformity in Raw Material as Essential as in Manufacturing—Some Construction Requirements—Capacity Unbalance Test of Duplex Cable and Methods of Making

By W. N. Furthmann

The efficient operation of a loaded telephone circuit depends not only upon the efficiency of the loading coils, but also requires the same high standard in every part of which the entire circuit is composed. Therefore, in contemplating the loading of a circuit it is necessary to make a minute transmission study of every function of the circuit.

It will not be sufficient to determine the transmission losses of a given switchboard, or a particular section thereof, nor will it suffice to make a general study of operators' cord circuits, power circuits and also subscribers' circuits, with the purpose in mind of placing them in good operating condition. A specific study of each piece of apparatus included in each circuit, is absolutely essential in considering a loaded circuit. In other words, the loading of circuits in a telephone plant will require its complete renovation and improvement.

From a transmission standpoint, this necessary improvement of efficiency not only applies to the switchboards and subscribers' apparatus, but is, if possible, more applicable to the line conditions of the plant. It can therefore be stated that the loading of a circuit will bring to light all of the weak points of that circuit.

In considering the loading proposition there cannot be a middle road. Fairly good loading may be a handicap rather than an improvement. Even though the most highly efficient loading coils obtainable were placed in a circuit, still the object desired will be devoid of results unless the circuit in which they are used conforms to the same high standard of that particular coil.

It has been pointed out in previous articles on loading coils and cases (TELEPHONY, Volume 68, Nos. 16, 17, 23 and 24), that their efficiency depends upon the absolute uniformity of their mechanical and electrical construction. It has also been shown that this uniformity must not only be preserved by exacting engineering requirements, but that every possible safeguard should be observed to continue the good work during their manufacture. It has been pointed out that the many and varied demands of liberal manufacturing limits, brought about by the endeavor to produce, commercially, a highly scientific piece of apparatus, tend to overthrow the quality of the finished product. After all of the required precautions are taken, the arch enemy (cross talk) of an efficient loading coil still exists.

Some idea of the problems of transcontinental telephone transmission may be obtained, when it is said that all of these difficulties are present in the design and construction of duplex cable. The intricate situation becomes more involved because the problems appear in a different manner and form than are found in the design and construction of a loading coil. The situation, however, possesses the redeeming feature in that the mechanical and electrical laws of both these branches of the art of loading are not only very similar, but are derived from the same base. It is also true of the efficient construction of duplex cable that the satisfactory completion of all of the mechanical processes involved in its manufacture are proven in by the electrical tests applied during the processes of its construction and after the cable is completed.

From an engineering standpoint, it may be stated that the experience which was obtained in eliminating cross talk from loading coils made it possible to design, construct, test and produce duplex cable of low cross talk unbalances. It was of primary importance that cross talk should not appear again in the circuit after the duplex cable was spliced to the loading coil cases.

The uniform mechanical construction of duplex cable can only be positively obtained by the application of very rigid

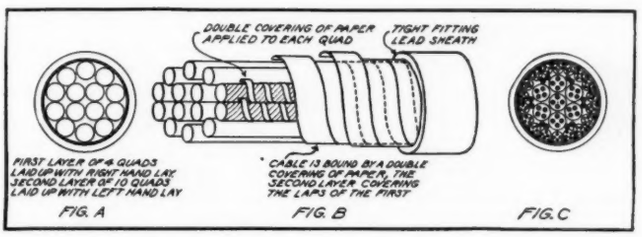

DOUBLE COVERING OF PAPER APPLIED TO EACH QUAD
TIGHT FITTING LEAD SHEATH
FIRST LAYER OF 4 QUADS LAID UP WITH RIGHT HAND LAY. SECOND LAYER OF 10 QUADS LAID UP WITH LEFT HAND LAY
CABLE IS BOUND BY A DOUBLE COVERING OF PAPER, THE SECOND LAYER COVERING THE LAPS OF THE FIRST
FIG. A
FIG. B
FIG. C

Fig. 1. Lay-up of Duplex Cable Stubs and of Main Duplex Cable.

electrical tests. In order to comply with electrical engineering tests that are strictly laboratory requirements and still produce cable commercially, not only is high productive skill required, but also the most efficient mechanical engineering. In manufacturing it has been found that even the most expensive grades of raw material vary greatly and in the most eccentric manner. Automatic machinery carefully attended and supervised, must be used in order that the cost be not prohibitive.

Cross talk in a loading coil is independent of the effects of humidity, but the most treacherous aid of cross talk in duplex cable is humidity. It has been found in the manufacture of duplex cable that humidity, although considerably lower in the winter months, is sufficient to make the problem of its elimination a complex proposition.

It has been found that the electrical constants of duplex cable after its manufacture, are not altered by severe weather conditions of heat or cold. Every precaution must be observed in transporting and installing it not to subject the cable to undue strains or stress that would have a tendency to kink or bruise the sheath, thus in turn destroying the uniformity of the quads of wire of which it is composed. Excessive exposure during the splicing operation would, of course, be considered a matter of carelessness and would have no bearing in considering the qualities of the cables from a design standpoint for field service.

The layup of duplex cable stubs for loading coil cases is shown in Figs. 1-A and 1-B, while the layup of duplex cable when manufactured in long lengths for regular underground service is shown in Fig. 1-C. Inasmuch as the principles and methods of construction have been standardized, it will be possible to discuss the various forms of the cable in a general manner, even though the electrical limits, which are specified, depend upon the lengths of cable tested.

The first loading coil cases, manufactured for use in the transcontinental line, were not equipped with stub cables of duplex cable design. As a matter of fact, they were made up by hand rather than by machinery. Consequently, they were subjected to non-uniform conditions and were considerably exposed to humidity and moisture on the

hands of the operators. Although the wires were twisted, stranded and formed in the standard manner, the desired uniformity could not be obtained in the finished cable. The sections of the stub cable were also formed by hand and the tight fitting lead sheath was assembled by pulling it over the cable, instead of pressing it on with cable sheath presses.

These cable stubs were applied to loading coil cases installed in the New York-Washington section of the transcontinental line. They contained seven phantom coils and 14 side circuit coils. Therefore, the cable stubs each consisted of 28 quads, 14 of which were to be used for the seven phantom coils and 14 for the 14 side circuit coils. A stub cable consisted of four sections of cable each containing seven quads. A quad consists of four wires of two pairs each.

Desirability of Uniformity of Cable Stubs.

Uniformity of these cable stubs was particularly desirable because the cable stubs were directly attached to the coils on the dowels, so that advantage could not be taken of the method of poling for cross talk which has been described in a former article. Even though the individual coils had been of the most efficient type from a cross talk standpoint, and the main duplex cable for the complete section also of the same high standard, the stub cable, as a defective and weak link, would have destroyed all of the advantages obtained through the high standard of the other two parts. In other words, complete success in defeating the evils of cross talk depends upon its uniform reduction to a minimum in every part and form of a loading coil circuit. It may be well to emphasize the positive fact that cross talk cannot be entirely destroyed and eliminated.

The second underground cable section of the transcontinental line was installed between Boston and New York. By assembling the cases for this section with a cable stub made up strictly in accordance with improved duplex cable design and by using individual dowel cables, thus permitting the use of poling for cross talk in the connecting chamber, an average resultant cross talk of each unit of loading of the completed case of 100 units was obtained. The resultant cross talk of each unit of loading of the complete cases installed in the New York-Washington section was 500 units.

The continuous cable underground route between Boston and Washington is about 475 miles in length and the coils are spaced about 1.4 miles apart. An idea therefore may be obtained of the large amount of cross talk removed from a relatively short section of the transcontinental line by the elimination of a small defective link in the chain between the coils and the main cable.

The most desired result, from a uniformity standpoint, in the construction of duplex cable would be of no avail in reducing cross talk unbalances if there was any material variation in the raw materials used. The problem of obtaining raw materials for a large cable plant for producing ordinary insulated cable is a difficult one. In the manufacture of duplex cable this difficulty is considerably greater. Cost of the raw materials is, of course, a tremendous item. When it is considered of equal importance that the various sources of supply shall be highly dependable, it will be realized that the purchasing of raw materials does not possess the advantages of an open market proposition.

The raw material specifications should be a part of a contract that contains a penalty clause for damages. As a very large expense is entailed in a cable plant in simply preparing the various processes for a run of 100 miles of cable and since cross talk unbalances cannot be immediately traced in the preliminary operations to variations in a given material, provision must be made in advance for any defects that might later be discovered and proven. Tracing a probable variation in a given raw material will result successfully only through a process of elimination.

Cross talk between pairs in a cable is largely due to inequalities in the capacities between the wires of one pair and those of an adjacent pair. A material part of this inequality of capacities may be due either to variation in raw materials, moisture or non-uniform twisting of the various pairs of wire.

The variations in raw material may be either due to a difference in texture or in its degree of hardness. Paper is used almost exclusively as an insulation of the conductors in duplex cable. A material variation in its thickness would cause a variation in the spaces between the wires. Paper texture is also an item of primary importance. Paper of certain texture will be more susceptible to moisture than others. Some grades of paper have a greater tendency to retain moisture than other grades. Methods of removing moisture will therefore be more efficient with one grade than another. The color dyes of the paper are also another determining factor.

There are therefore many reasons for capacity unbalance between wires of a pair. The result of this unbalance in the completed cable may be either cumulative or one capacity may have a tendency to offset the other. It is because of this fact that, in splicing cable to cable, poling for cross talk will be as advantageous as when splicing together the coils that compose a unit of loading in a loading coil case.

Another important factor in obtaining uniform construction of duplex cable is the care used in obtaining a uniform length of twist of the wires of a pair, or pairs of a quad, and of quads composing a section. In considering the twist of wires of a pair, it is clear that unequal twisting will produce unequal lengths of wires. This condition will produce unequal direct current resistance of the wires. Consequently, provided no other capacity were present, this difference in resistance, alone, would produce cross talk unbalance.

In balancing loading coils for cross talk a similar condition was noted. Because of the method of winding employed, it was possible to remedy the fault when applying the non-inductive turns of German silver wire.

The balancing of the direct current resistance of the windings was found to be so important as to require the use of a slide wire bridge for the purpose. This method for many good reasons would be impracticable for use as a solution of this defect in duplex cable. Some other means must be used. The only satisfactory method is the use of a machine that absolutely performs various twisting operations with equal lengths of twist. These machines are of a complicated and expensive structure. Their installation at a very much greater cost than the machines formerly used in twisting the conductors of duplex cable, is proof of the necessity of reducing cross talk wherever and whenever found.

High Insulation and Small Dielectric Losses.

Uniformity, as a highly prized object in duplex cable from a mechanical standpoint, would be of little or no value if high insulation resistance and small dielectric losses, due to hysteresis losses in the paper insulation, were not also obtained.

Before applying the lead sheath to duplex cable, it was formerly the practice to bake the cable in the form of reels in a steam heated oven for 72 hours at a temperature of 220 degs. Fahr. The statement, therefore, that after the sheath was applied large quantities of moisture still remained in the cable is somewhat surprising.

It has recently been demonstrated in the manufacture of duplex cable, that if calcium chloride is used in suitable apparatus for producing dried air, and air so treated is forced through duplex cable having a dry core, comparatively large quantities of moisture in the form of water can be driven off from cable of long lengths. It has been proved, upon testing cable so treated, that the dielectric losses due to hysteresis in the paper insulation of the cable wire are reduced 50 per cent. of the original value, thereby increasing correspondingly the transmission efficiency of the cable when loaded.

Until recently it was the practice to use, for duplex cable, a lead-tin sheath, ⅛ inch in thickness. The amount of tin by weight was not less than 3 per cent. Owing to the very high price of tin, it has been decided to substitute antimony for the tin. This composition has been found very satisfactory, not only electrically but also mechanically. Long life tests have been made of the lead-antimony sheath where it was subject to acids of high reactive agents and also to severe electrolysis conditions. The results of these tests, extending over several years, have been so satisfactory that it has been decided to standardize this antimony sheath. The resultant saving has been considerable and no material difficulty in manufacture has been experienced.

In manufacturing a lead-antimony sheath, care must be taken in puddling this metal, as antimony has a tendency to rise in the tanks above the lead. If the slight percentage of antimony that is used is not carefully mixed, it will be found that parts of the sheath consist mostly of antimony and the remainder, made up in the same run, is entirely composed of lead.

As previously stated, the mechanical and electrical construction of duplex cable has been standardized. The size of a cable depends upon the number of sections of quads it is desirable to include within one cable of a given length. The number of quads in a section depends upon the number of circuits to be loaded and upon the degree of loading that is to be installed. In other words, the layup of a duplex cable depends entirely upon the transmission problems involved in the circuit of which it is to form a part. It will be clear, therefore, that there may be many sizes of cable and that the layup of their various sizes depends upon uniform distribution of the pairs, quads and layers of which it is to be composed.

The loaded cable in the United States is made of Nos. 22, 19, 16, 14, 13 and 10 gauge wire. The No. 22 and No. 19 gauge cable is used for loaded non-phantom circuits, generally in large cities for through trunk service. The No. 16 and No. 14 gauge cable are used for toll trunk lines entering large cities which is known as light loaded cable service. The No. 13 and No. 10 gauge cable is specified for medium, medium heavy and heavy loaded service and is now used on the Boston-Washington section of the Boston-San Francisco circuit.

Transmission conditions may require that a cable shall be composed of No. 10, No. 13, No. 16 and No. 19 gauge wire. The mechanical uniformity of such cable becomes a good engineering problem when it is understood that each quad of four wires must be made up of the same gauge of wire and that pairs of the smaller sizes are formed in among quads of the larger sizes of wires.

It is also necessary to preserve a definite color scheme, not only of the pairs of a quad, but also of the wires of those sizes that are only twisted in pairs. In a cable where four gauges of wire are used, some idea of the problem may be obtained when it is pointed out that, in order to obtain such a color scheme, more than one kind of insulation is found necessary. Paper insulation has been found decidedly more efficient than cotton insulation. The use of the latter is permitted only because the preservation of a color scheme is a paramount issue.

It is somewhat difficult to describe the procedure which is followed in obtaining a uniform layup of the various pairs and quads of a cable. Briefly, the following points may be noted as covering the most important requirements that should be followed:

Where the twist of the first pair of a quad is four inches, the second pair should be five inches, the twist of such a quad being seven inches.

The length of twist of the first pair of the second, or adjacent, type of quad should be longer than the first pair of the first quad, for example, four and one-half inches, and the second pair of the second quad longer than the second pair of the adjacent first quad, for example, five and one-half inches. The length of twist of the second quad should be longer than that of adjacent first quad, for example, eight inches.

Adjacent quads in each layer are made up of different types of quads, that is, of pairs having different lengths of twist.

Adjacent pairs in each layer of non-quadded pairs should have lengths of twist differing by at least one-half inch.

The quads and non-quadded pairs are formed in a core made up of reversed layers.

Loaded cable for duplex service is tested for conductor resistance, electrostatic capacity and electrostatic capacity unbalance, insulation resistance and dielectric strength.

A resistance of five ohms per mile of cable is allowable for No. 10 gauge cable; 11 ohms for No. 13 gauge; 14 ohms for No. 14 gauge; 25 ohms for No. 16 gauge; 46 ohms for No. 19 gauge; and 92 ohms for No. 22 gauge cable.

Electrostatic Capacity.

In every length of cable the average and maximum mutual electrostatic capacities of the pairs and quads should not exceed the values given in the following table:

Mutual Electrostatic Capacity—Microfarads Per Mile.

Pairs,		Quads,	
Average	Maximum.	Average	Maximum.
0.074	0.081	0.115	0.125

The pairs and quads of each gauge of conductor should separately meet these requirements, as should also quadded and non-quadded pairs of the same gauge.

The capacity of a pair is that measured between the two wires of the pair, the remainder of the conductors being connected to the sheath. The capacity of a quad is that measured between the pairs of the quad, the two wires of each pair being connected together. The capacities should be measured by the charge method and the values specified in the table are those required at 68 degs. Fahr.

For every length of cable the mutual capacity unbalance between various circuits in the cable should not exceed the value given in the following table:

	Unbalanced per Length in Micro-microfarads.	
	Average.	Maximum.
Between the two pairs in each quad.....	50	100
Between each phantom circuit and the two pairs forming the phantom.....	100	200
Between adjacent phantom circuits.....	50	100

In every length of cable each conductor should show an insulation resistance of not less than 500 megohms per mile of cable at 68 degs. Fahr., each conductor being measured against all the rest and the sheath.

The insulation of each conductor should be capable of withstanding a direct current potential of 500 volts without rupture.

The electrostatic capacity should not increase, nor the insulation decrease, beyond the limits specified for a period of one year after the cable has been placed, spliced and connected to terminals, due to defective material or manufacture.

(To be Concluded.)

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

The answer to these questions will be found in the reading section bearing the same number. Answers are not to be sent to TELEPHONY for criticism. For the benefit of those desiring the advantages of a correspondence course, the Engineering Extension Department of the Iowa State College has volunteered to answer questions and criticize replies to questions and solutions of the problems which will be presented from time to time in connection with the course. No charge will be made for this service and the offer applies to all subscribers of TELEPHONY regardless of whether they live in Iowa or elsewhere. Correspondence should be addressed to the Engineering Extension Department, Iowa State College, Ames, Iowa.

168. How is the graphic method a check on accuracy when many computations of similar character are to be tabulated?

169. What strength of current will develop 2.16 calories in one second in a circuit having one ohm resistance?

170. In what respect is a curve showing ampere turns per inch for wrought iron more complete than *any* table?

171. Using the curve in Fig. 68, determine the number of ampere turns per inch required to produce 50,000 lines of force per square inch in wrought iron.

CHAPTER VII. Graphic Methods (Continued).

172. *Generator voltage and armature position.* In considering the nature of rise and fall of the voltage of an alternating current, the graphical method is almost universally used. Let us for the moment consider the magneto generator armature winding in its field shown in theory in Fig. 69. During the revolution of the armature around its axis, it occupies for an instant each possible position around its center. In the illustration five

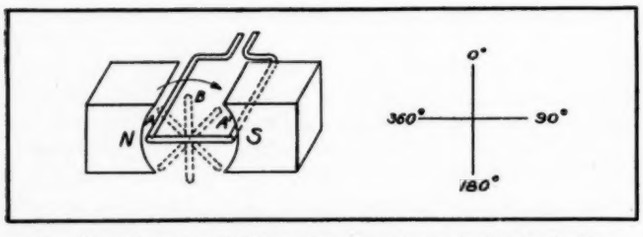


Fig. 69. Positions of Generator Armature During Rotation.

of these positions have been sketched. Suppose the armature winding is traveling in the direction shown by the arrow. When it is passing through the position shown by the solid lines, it is *cutting* the *greatest possible* number of lines of force. In no other position, except the one in which it occupies the same position but is lying bottom side up, can it cut as great a number of the lines of force. This is because the wire of the winding is moving *across* the magnetic lines at right angles to them.

Now consider for a moment, the position marked *A*. When the armature winding is passing through this position, it is partly cutting lines of force and partly *sliding along them* without cutting. When the winding has reached the position marked *B*, it is not cutting *any* lines of force but is moving lengthwise along them in its travel from one side to the other. We know therefore that in the first position, the *voltage* produced will be greater than it will be in any other position of the armature except the one in which it is bottom up but in the same relative position. We also know that, when the winding is passing through the position marked *B*, the voltage will be zero as the wire is cutting no lines of force. When in the positions *A* and A^1, voltage will be somewhat less than that produced in the first position. It will, of course, be greater than the voltage produced when the winding is passing through *B*.

173. *Curve of alternating current voltage.* When the armature has made one complete revolution, it has passed through the four quarters of a circle. We know that each one of the quarters of the circle is 90 degrees. Therefore the armature will have passed through a total of 360 degrees in one complete rotation around its axis. Suppose we lay out these 360 degrees on a straight line. Then at each division of the line representing one degree, measure a vertical distance to represent the *voltage* being produced while the armature winding occupies the corresponding angular position in its revolution around its axis. If we connect the points so located, a curve of the alternating voltage will be produced. Such a curve is shown in Fig. 70.

At the left hand extreme is a point representing 0 degrees. This corresponds to the point *B*, Fig. 69, in which the armature winding is not cutting any lines of force. At the point marked in the curve "90 degrees," the armature winding has reached a point one quarter of a circle or 90 degrees from its starting point and is cutting the greatest possible number of lines of force. Therefore the voltage is at the maximum as shown by the curve. When the armature has rotated one-half of the complete circle or 180 degrees, it is passing through a position exactly opposite to the one occupied at starting. Therefore it is not cutting any lines of force and the voltage produced is at its minimum.

As the rotation proceeds, the same conditions are met, *but* the voltage produced (Fleming's rule) will now be in the *opposite sense or direction.* Therefore the curve is drawn *below* the line. When the armature has reached its starting position, it will have passed through 360 degrees and will again

produce, in its windings, a voltage exactly similar in every way to the curve already discussed. In other words, the voltage curve shown in Fig. 70 will cover the voltage that is produced for *each* revolution of the armature in a two-pole generator.

174. *The sine curve.* In Fig. 71 is shown a diagram of the complete circle of reference inserted between the poles of the magneto generator. The straight vertical lines represent the lines of force and dotted lines, 1, 2, 3, 4, represent, by their length, the *number* of lines of force *cut* by the armature winding at the several positions around the circle.

These lines, 1, 2, 3, 4, (Figs. 70 and 71) are called the sines of the angles which determined their length. For this reason the alternating current curve based upon their length is called the curve of sines or the sine curve. In assuming that the lines 1, 2, 3, 4, are equal in length to the sines of their angles, it is always understood that the radius of the circle is taken as being equal to one. In this way the same angle will always have the same sine value regardless of the size of the circle used to lay it out.

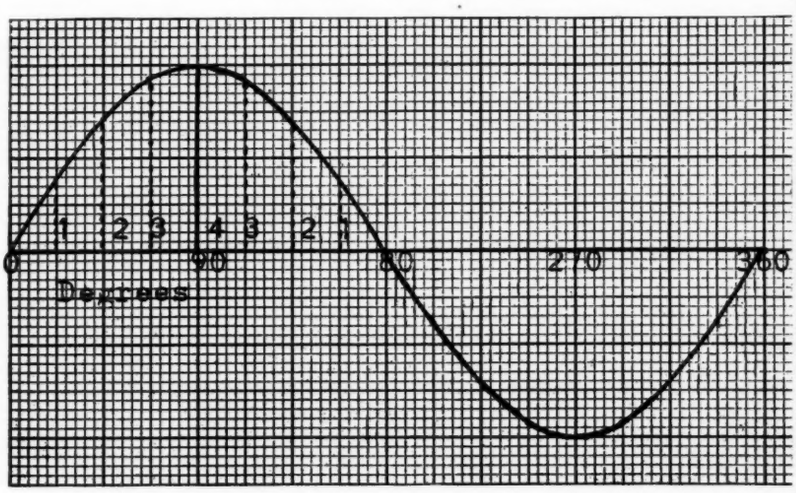


Fig. 70. Line Curve of Alternating Voltage.

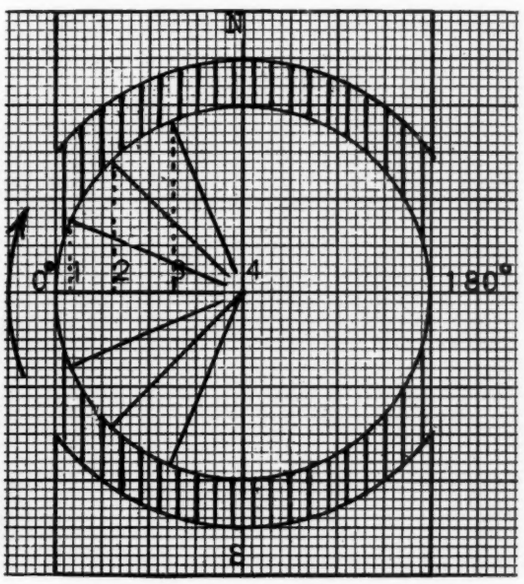


Fig. 71. Circle of Reference for Sine Curve.

Alternating currents do not always follow this sine curve exactly in voltage. It is the theoretically perfect voltage curve, however, and is always striven for by the designers of electrical machinery.

Before passing to another subject, the reader should note another property of the alternating current curve. It will be readily seen that the voltage of the current at 90 degrees is very high. At 270 degrees it has the same value as it has at 90 degrees but it is in the opposite direction. At 0, 180, and 360 degrees, it has a zero value.

What is meant, therefore, when we speak of an alternating current of 110 volts? It is clear that any value such as this applied to an alternating current must be some sort of an average. Such is the case and the average is obtained by the mathematical law of sines. The true electrical average of all these values of the voltage is the square root of the average of the squares of all the individual or instantaneous values. If the alternating current voltmeter reads 110 volts, it means that the voltage at 90 and 270 degrees in the cycle actually reaches a momentary value of 155.5 volts.

(To be Continued.)

Industrial Unrest and Telephony.

In the report to Congress of Basil M. Manly, director of research and investigation, of the United States Commission on Industrial Relations, containing findings of fact and recommendations of Frank P. Walsh, chairman of the commission, and John B. Lennon, James O'Donnell and Austin B. Garretson, members of the commission, the telephone industry is included in the category of trades specified as being under the onus of industrial unrest. The report follows an investigation of two years, during which time many prominent interests connected with telephone and telegraph business were examined. It is a minority report, the majority being submitted by members of the commission representative of employers.

Not the least interesting phase of the report is its recommendation for government ownership and operation of the telephone and telegraph. In the case of telegraph companies, the taking over of the systems by the government is advocated as being constitutionally specified and on the ground that service is being performed inefficiently and at an unusually high cost "in spite of the low wages paid the operators."

In the case of the telephone systems the same reason is given in the first instance, but in addition charges are made that the American Telephone & Telegraph Co. was created for purposes of evasion. The report alleges that the transaction by which the company, which had been a subsidiary of the American Bell Telephone Co., absorbed the parent company in 1899, was not only designed to evade the legal limitations contained in the Massachusetts charter of the American Bell Telephone Co., but resulted in the increase of the capitalization of the combination from $25,886,300 to $75,276,600 without the addition of any new capital.

The investigation of the commission in relation to telephone and telegraph, as interpreted by these members, shows that the scope of the Newlands act, which applies only to employes engaged in the operation of interstate railroads, is too narrow and leaves the public service in the transmission of intelligence and the handling of interstate commerce likely to be interrupted by labor disputes without any adequate legal provision, either for mediation and conciliation or for making the facts involved in the dispute known to the public.

It further finds, the report says, that even as applied to

train service employes, the Newlands act provides no means of bringing the facts before the public, except when both sides agree to arbitration. Finally, it shows that the selection of impartial members of arbitration boards has almost without exception devolved upon the Board of Mediation and Conciliation, owing to the inability of the parties to agree. This not only imposses an unpleasant and burdensome task upon the Board of Mediation and Conciliation, it is stated, but tends greatly to weaken its influence.

It is suggested that the commission recommend the extension of the Newlands act to cover not only all classes of railroad employes, but all employes of public service corporations which are engaged in interstate commerce, which includes many telephone companies. The functions of the Board of Mediation and Conciliation under the Newlands act should be extended to provide for the creation of boards of investigation, to be formed only by consent of both parties and to make a report of facts and recommendations which will be binding upon either side, the report says. The Board of Mediation and Conciliation should also be authorized by Congress to create an advisory council, composed of equal numbers of employers and employes, for the purpose of creating a panel of names from which impartial arbitrators may be chosen by the Board of Mediation and Conciliation.

Getting down to the telephone companies the report says that the investigations of the commission are the basis for the following statements:

The condition of the telephone operators in both interstate and local service is subject to grave criticism. The wages paid, even in cities having the highest standards, are insufficient to provide decently for women who have no other means of support. The requirements and nervous strains incident to the service are so very severe that experienced physicians have testified that operators should work not more than five hours per day, whereas the regular working hours are from seven to nine per day. The operators, who are principally girls and young women, are required to work at night, going to and returning from their work at home when they are subject to grave menace. The policy of the companies in general provides for sanitary and reasonably comfortable working places, and for attention to the recreation and physical needs of the operators, but in a number of cities the conditions even in these respects are subject to severe criticism.

The telephone operators are unable to secure reasonable conditions for themselves, because of their youth, and the fact that they ordinarily remain in the service only a short time. The organization of employes for their own protection is effectively resisted by the employing companies.

The American Telephone & Telegraph Co., with its subsidiary and affiliated corporations, controls more than 70 per cent. of the total telephone business of the country. The American Telephone & Telegraph Co. has been enormously profitable, and is well able to afford the necessary improvements in working conditions. The American Telephone & Telegraph Co. has increased its capitalization enormously without the investment of new capital.

It is suggested that the commission recommend the purchase by the Federal government, after proper valuation of the property, of the interstate and local telephone companies, or such part of their equipment as may be necessary for the efficient operation of a national telephone system.

The transfer of all employes, including officials necessary for the efficient operation of the national telephone system, to the Federal service, as far as possible, and the absorption, as far as practicable, of all employes who are not necessary for the telephone system into other branches of the Federal service.

When such employes are transferred to the Federal service, the creation of a special commission to establish salary ratings and other working conditions on a proper basis.

In the meantime provision should be made by Congress for the creation of a minimum wage board, to fix minimum wage standards for women employes who are engaged in the transmission of messages in interstate commerce. The board should be authorized to differentiate between localities in fixing minima, if on due consideration such differential rates should be deemed advisable.

The creation of minimum wage boards in the several states to fix minimum wages for all women employes engaged in service within the state.

Passing August

Dog Days—Beginning a New Year

By J. C. Kelsey

Man's vitality is lowest before dawn. Approaching this hour the weary patient grows weaker; he seems to sink into the shadows of death, and the family sees the grim reaper at the door. It seems but a question of moments when the spirit of the loved one will depart forevermore.

Presently the sun rises, the patient sinks into quiet sleep; the doctor leaves and the family knows that a day's respite is at hand.

Business vitality is lowest in August. It is the hour of the least power of resistance. It seems as if the business patient would turn its face to the wall. The weary weeks of July have left it with little courage or hope. It seems as if the weary waiting at the patient's bedside were soon to end.

Presently it is September, the patient sinks into quiet sleep, and we know that a year's respite has been granted.

August days are dog days for the world. The troubles we are having as a neutral can be more easily borne at other times. In August the nature of man is more susceptible to insult; he is more sensitive to injury. He is somewhat like dynamite, which in the early hour of dawn is at its most sensitive period, and ready to go off on the least agitation.

The sinking of the Arabic seems all the more outrageous because of the dog days. If the August days pass into September before men are called upon to decide matters, there will be no war.

Dog days are necessarily vacation days. Vacation days never come in winter, because men and women are keyed up to work. They are let off in July and August to keep the management from getting nervous and discharging them.

It is really a time when initiative, energy, and all the business traits worth while are in total eclipse. Only yesterday I talked to a business man who cannot see daylight ahead. Yet next week will find him in full swing, because the dog days will be over.

It reminds one that business has always been going to ruin. I remember ten years ago that men declared the telephone business to be entirely ruined. We were then yet to pass into the busy years of 1906 and 1907. Later we passed out of 1908 and finally into the busy year of 1913.

Today we are wrestling with the discouraging years of 1914 and 1915. Who can say that 1916, 1917 and 1918 will not again make all our wheels hum? They are bound to.

So many people give up hope in the second or third inning. It is not always the leader in the great race who finishes first; he usually sets the pace and meekly subsides at the finish.

The war is not necessarily Germany's because she performed so remarkably the first year. Our Civil War was not the Confederacy's because for two years the Northern troops could not win a decisive victory.

And because business is bad one year or two years is no reason to give up hope. Once steel got down to $9 a ton. But did it always stay there? Hardly!

Knowing your August feelings, I took a vacation, too. You needed a rest, and so did I.

I took a vacation in Kansas, not bleeding Kansas now, but rain-soaked Kansas. The churches have lost one active occupation, that of praying for rain.

My early recollections of the great plains seem bounded by a rain-maker's shanty on one side, a prayer meeting on the other, and crops withering under blasting winds.

But the plainsman never became discouraged, even if his August days were real days of terror. He knew that nature was in the low ebb of vitality and would soon awaken and average up.

One is struck by the truth of the conservation of energy theory. Nothing comes to this earth and nothing leaves it. We have not changed since the time of Adam. A few years of drought are followed by an overflow of water. Everything is evened up.

Since 1910, a circle, centering in northern Missouri, having a 500-mile radius, has been dry. Wells, springs, creeks and rivers, which flowed steadily as far back as men remember went completely dry. Yet today every abandoned spring is bubbling over with precious water and will do so for some time to come.

How well this applies to business! Our years of activity are followed by quiet. Then after a long calm there comes a great burst of activity.

Neither men nor nature have been able to avoid spurts or spasmodic effort. What goes up must come down; extravagance is followed by economy; activity by sluggishness. It is hard to learn the lesson of a permanent moderation.

In other words, there is a law of averages which cannot be denied. But we forget that in such times as these. Yet it is that very law of average which decrees the present lassitude of business.

These are surely dog days in Georgia. Leo Frank would not have been hung in September. The mob of business men who stood on Mary Phagan's grave and took their absurd oaths, were victims of dog day vitality.

Does it not sound like a dime novel story for business men to go through such mummery as that of taking oath in a graveyard? The state of Georgia has its monument to August; it also has something to do to clear its name.

Chicago has its Eastland. Would it not be a fine thing for that Georgia mob to come to Chicago and hang those responsible for the Eastland tragedy? It would be a fine conclusion to that terrible picnic catastrophe.

Whether the lack of stability of this boat was due to the enfeebling months of July and August no one can say. Possibly the captain felt the lassitude of the hour and, while sighing for some summer resort, pressed the wrong lever.

Galveston felt the hand of dog days too. Thanks to the sea wall, the waves could not repeat the great disaster of fifteen years ago.

It is apparent that there is no place in the world where man must not exert every effort for his safety and comfort. It is encouraging to know that the hand of man has been able to stay the attack of the sea aided and abetted by a 90-mile-an-hour wind.

Men in business can take a lesson from Galveston by realizing the necessity, during years of prosperity and activity, of building a sea wall against the possible buffeting of adversity. Telephone men particularly have relatively little liability, yet no telephone company should fall below a reserve any more than a bank.

These are surely dog days in Europe. If the muss keeps up much longer, nobody's bluff will be more than a scrap of paper. For years a favorite nightmare in Germany has been a Cossack, just as the Frenchman saw a Uhlan in his awful dream.

Now Russia is considering a new capital, while Turkey is desperately fighting for a last foothold in Europe. All the while, gigantic bills are being run, and everybody's credit department is having fits.

Getting back to Kansas and a typical Kansas county of 28,000 people, I found there were 1,000 automobiles in use. At a band practice at a county seat town, I counted 188 automobiles standing about the square. The town has four miles of paved streets and on this limited pathway these cars give a few moments of evening pleasure. Really, a limited and fearfully expensive luxury.

Getting down to figures, 1,000 cars costing an average of $1,000 each, means $1,000,000. In the county seat banks, there are $1,000,000 on deposit. If these deposits were invested in such a fleeting, decaying security as a rapidly depreciating automobile, the hand of the law would swoop down upon the bankers for violation of a trust. It really is a problem for every community to face.

It is a dangerous condition when dray wagons haul tires instead of the usual incoming freight.

Does this seem reasonable? A community with $1,000,000 deposits is only able to buy its second car. But after this community buys its second million dollars worth of cars, what will become of the bank deposits?

Besides, there is little or no use of these cars. The retired farmer runs out to his place occasionally, but in the main he is a sort of a jitney driver. He will haul you anywhere for a dollar. One farmer with a Packard will haul a whole family 100 miles and back for $10. All the time, you know that it costs 25 cents a mile to run a big car.

Little does this retired farmer realize that he loses $40 every time he hauls a big load 200 miles for $10. Truly, automobiles are making dog days for many once-prosperous farming communities.

The telephone company has three Ford cars. These three cars seemed to be the only gasoline machines which had any economic justification. This telephone company lies in the midst of a section thickly populated with mutual companies. There is a splendid feeling on the part of the management in regard to the mutuals. It looks upon the 1,500 mutual tele-

phones and lines as a saving of practically $100,000 to the original company, which has 2,800 stations.

The original company had no means of raising $100,000 for such work. It could not ask for $50 subscriptions from each user, so it wisely submitted to the organization of mutual companies which could finance themselves that way.

The need of the hour is the necessity of bringing mutual telephone companies under the control of the commissions. As long as public utility commissions exist, and no one can say how long they will exist, it is not fair to give one form of service freedom while the other is bound.

The mutual telephone company in many ways offers an ideal situation, especially when relatively large financial requirements are difficult to meet. Yet it should be under control because of its tendency to destroy existing property.

It is strange how human nature works, even outside of August. The average farmer would not destroy his neighbor's property, and he will do anything for his friends. Yet when a merchant of this town retired and placed some of his money in the stock of the original telephone company, his former farmer customers and friends warned him that they would cheerfully ruin him. They have not done it yet, however, so great is the vitality of the business.

The telephone business truly seems to be an exception, not only in costing more money as it grows, but in its human relation.

The only dog day tendency is the utter delay in getting a decision from the average commission. It is well known that they have a great deal to do, but there is no reason for delaying a simple decision beyond a few months. It is better and more profitable to all concerned to have quick decisions with some mistakes, than to drag along interminably.

Some commissions are still old-fashioned enough to look upon a small corporation with suspicion and insolence as well. May we have more speed now that July and August days are over!

As one looks about the world, he has reason to rejoice that he lives in America. As one looks further about the industrial world, he has reason to be glad to be in the telephone business —if that is his occupation. All through the year, which has so vexed the civilized world, the telephone business marched along evenly.

The Bell interests, early in the year of the war, showed some leased wire losses, but that condition was quickly compensated for by increased toll revenues. Independent companies everywhere report that they have made decided gains. The Manitoba Government Telephones, in spite of the war, which draws so hard on Canada, have made a wonderful showing.

True, the telephone business is not a story of wine, song and gaiety. It is only a bread and butter business, but being such a business, it gives its stockholders comparatively little headache.

It offers no attraction to the man who has a racing stable, or cruises in a yacht. To the average man, content with normal comfort, however, the telephone business offers many attractions.

About the only peak the telephone business has, comes daily in the number of calls. The telephone offers no great excitement and it has few dog days.

Any man with the least imagination can see in the expansion of business inevitably on the way, that an immense amount of money will be put into the telephone business on a rehabilitation basis.

We have had eras of activity followed by eras of quiet; we have had moments when it seemed as though our life work were about to crumble about our heads. Who can say that we will never have another season of activity? He is like the man who said steel would never exceed $9 a ton again.

Some men prefer dog days, and are at all times ready to take the joy out of life. For them there is always a green scum on the water of existence, not only in August but in all the months following upon it.

August is over. We are not dead yet, and we will live another year. Let us face this new year with a renewed determination to make our stockholders and possible investors believe and know it is the best business on earth.

MORAL: The way to resume is to resume.

Havoc to Telephone Systems Caused by Galveston Storm.

The terrific West Indian hurricane, which swept the gulf coast and eastern Texas on August 16, 17 and 18, played havoc with telephone and telegraph companies in the affected territory. Losses to the wire companies in south Texas will aggregate hundreds of thousands of dollars. Three days after the storm many telephone plants were still closed down, some because of damage to plant or central station equipment, others because of the lack of electrical current, most of the electric light plants being out of business.

The cities of Galveston, Houston, Beaumont and Port Arthur were heavy sufferers, with all the smaller towns along the coast. Many of the latter, including a number of seaside resorts, were wiped entirely off the map. The loss of life is comparatively small, considering the wide area covered by the storm, the force of the wind and water, and the heavy property loss, the known dead being 256, with about 65 still missing. The recent storm is said to have been worse than the great Galveston storm of 1900, in which almost 10,000 people lost their lives. Better protection against the elements is said to have saved the city of Galveston.

The Southwestern Telegraph & Telephone Co. was a heavy loser in the stricken area. In Houston this company had upwards of 15,000 telephones out of service the day following the storm, serious damage also resulting to its outside plants in Galveston, Beaumont, and in smaller towns along the coast. Early press dispatches indicated that the company would stand a loss of more than $100,000, although later advices are that this report is overestimated.

All wire service out of Galveston, telegraph and telephone, went out of order late Monday afternoon, and for more than 48 hours there was no communication between that city and the mainland. Wires from Houston in all directions were also down for two days. Early arrivals from the storm area state that railroad right-of-ways in all directions from Houston are covered with a mass of twisted telephone and telegraph wires and shattered poles. In some places along the coast the ground was so softened that poles fell from their own weight. The wind reached a velocity of 100 miles an hour in a number of places, and one observer counted more than 500 poles of a heavy toll line down along one railroad from Houston.

Submerged cables between Galveston and the mainland are all out of service. For two days the only communication held with Galveston was by two wireless messages, one from the United States transport Buford in Galveston harbor to Fort Sam Houston, in San Antonio; another, a wireless from a station in Galveston, picked up by an experimental wireless station in a high school in Waco, Texas.

The Western Union and other telegraph companies suffered heavily. The Western Union company's power plant in that city was submerged and new equipment must be installed. The telegraph companies relayed messages dur-

ing several days following the storm, by carrying them by ferry to Texas City, from which point one wire to Houston was in service. On August 21, five days after the storm, the wire companies had succeeded in getting seven telegraph wires and one telephone circuit working out of Galveston, the latter of weatherproof wire laid on what remains of the causeway connecting the city with the mainland. One telegraph company states that it has handled more than 300,000 messages out of the stricken teritory since the storm.

Independent telephone companies met with heavy loss. In Port Arthur, a city of 15,000, the first floor of the new fireproof building of the Texas Telephone Co. was four feet under water, submerging the power plant, relay racks, main frame and other equipment. This company states that more than 200 citizens of Port Arthur occupied the second floor of its building for safety during the storm. Water was in the streets of Port Arthur eight feet deep. The Texas Telephone Co.'s toll lines between Orange, Texas, and Houston, and from Houston to Taylor, Texas, were badly damaged. The exchange at Orange was put out of operation and plants elsewhere were damaged. The commercial wireless station in Port Arthur was blown away, and this city was without communication of any kind with the outside world for 36 hours.

It is estimated by those familiar with conditions that it will be several months before telephone service in the area covered by the storm can be restored to normal, as new interior equipment will have to be installed in many places.

Government Telephone Contract.

Readers of TELEPHONY will remember the article referring to the contract made by the government in Washington, D. C., with the Chesapeake & Potomac Telephone Co. of the Bell system. It was written by A. P. Connor of Washington, a lawyer and engineer of that city who has given this matter a great deal of attention. The article showed up the terms of the contract and made public many details that were not generally known up to that time.

The U. S. Treasury Department took an interest in the article and asked for a copy of it. The result has been that the contract was not renewed on July 1 of this year as in the past, but has been held up. It now appears that the government has taken steps to follow the suggestions in the article.

Tax Valuation of Telephone Property in Ft. Worth.

The city commission of Fort Worth, Texas, has accepted the valuation of $900,000 returned by the Southwestern Telegraph & Telephone Co. on its property in Fort Worth for the purpose of taxation. The company's franchise valuation was returned at $200,000, the same as last year, and its physical properties at $700,000, as against $675,000 last year.

Extensive Improvements Being Made at Pittsburgh, Pa.

The Central District Telephone Co. is rapidly pushing work on improvements to its Pittsburgh, Pa., plant, which will cost, when finished, in the aggregate of some $200,000. In the South Hills district the company is spending $41,000 in additional cables, and new underground conduits in West Liberty Avenue. On the North Side $77,000 is being expended for cables and for conduits in Perrysville avenue, to replace the present overhead lines, while in the Oakland and Herron Hill districts $17,000 is being expended in new poles and cables.

It has also been found that $42,000 more will be necessary to connect new conduits and cables to the present system with the new "Grant" central office, in the company's recently completed building in Seventh avenue. At other points improved facilities are being provided at a cost of $23,000.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision of Telephone Companies, Decisions of Courts in Matters Affecting Public Relations of Utilities and Actions of City Councils Bearing Upon Franchises, Rates and Service

Violation of Wisconsin Anti-Duplication Law Charged.

In a decision in the case of the Grange Hall Telephone Co., of Pierce county, Wis., regarding violations of the anti-duplication law by extending lines in the territory served by the Highland Telephone Co. in the town of Rock Elm, Pierce county, the commission holds that unless all connections between this line and the telephone instruments on the premises of subscribers are discontinued within one month from the date of this decision the matter will be certified to the attorney general for prosecution.

The commission goes into detail in discussing the fallacy of pretending to construct and operate telephone lines for three or four dollars a year. The commission says:

"If the patrons on the new line were to furnish the equipment necessary to give metallic service with a limited number of parties on a line, their investment per subscriber would scarcely be less than $40. Interest and depreciation on this conservation amount, which, it may be stated, must inevitably be borne in some form or other, even if not recurring annually as a cash disbursement, would amount to $5.60, if figured at 14 per cent., or assuming that a rate of interest of 5 per cent. on the investment and a rate of depreciation of 7 per cent. would be adequate, the annual expense, as distinguished from the annual expenditure, would be $4.80 per telephone.

"The cost of renewing batteries would be from 50 cents to $1 per year, and there would necessarily be some expense for materials for repairing the line. The cost of central office service, with proper provisions for interest on capital invested and for depreciation of property and with the allowance for replacing batteries and purchasing materials for repairs, would, in all human probability, make up a total of from $9 to $10 per year. This estimate does not include an allowance for labor furnished by the patrons of the line. If proper allowance were made for this item the full cost of the service could not reasonably be expected to be much, if any, less than the rate now charged by the Highland Telephone Co.

"On reason and on the experience of this commission, therefore, it would seem that the belief of the builders of this line that telephone service could be given at a cost of but a few dollars a year is a mistake."

Tentative Agreement for Miami, Fla., Franchise.

A tentative agreement between the special committee appointed several weeks ago by the Miami, Fla., city council and representatives of the Automatic Telephone Co. was reached at a conference last week, when special points concerning the franchise were brought up for discussion.

One of the main points brought up by the committee

was that the wires of the new company in a certain restricted district should all be placed underground. It was also insisted by the committee that all over the city the wires and poles of the new company should be placed through the center of the block wherever it would work no special hardship on the company. A. S. Metzner, general manager of the company, who attended the meeting, stated that the company would be willing to agree to these points.

It is also included in the franchise that the company will start work within eight months after the franchise is granted and that the telephones will be in operation within 18 months. The company is to pay the city $720 per year for a period of 30 years, making a total of $21,600 as the purchase price of the franchise. Included in the agreement is a clause under which the city, at the end of ten years, has the right to purchase the new company at a price to be fixed by a board of arbitration. The damage features and proper operation features are covered by bonds in the franchise.

The maximum rate which the company may ask for its service is placed at $3.50 for business telephones and $2.00 for residence telephones. A charge of 50 cents for each extension is to be allowed. Information regarding the operation of automatic companies in other cities will be obtained by the committee before the matter is taken before the city council for its approval of the franchise.

To Investigate Desirability of Merger.

In an effort to bring about some crystallization of sentiment toward the possibility and desirability of a single telephone system in Rockford, Ill., the representatives of 25 local organizations were recently called together by J. B. Whitehead, of the Rockford real estate board, the sponsors of the movement. A sub-committee was appointed to investigate and report such information as they can secure on the following points:

(1) The rates and number of subscribers and number of stations on each telephone system in the city of Rockford and the cost per station to each subscriber.

(2) The growth or loss of business during the past ten years on each system.

(3) The estimated value of each plant.

(4) The number of subscribers in the city of Rockford renting both telephones.

(5) The percentage of stock or bonds of each company owned by citizens of the city of Rockford.

(6) The overhead charges and operating expenses and such other information that may be obtained which would throw light upon the telephone situation.

(7) If deemed advisable to send out a letter of inquiry in the name of the full committee, with return post card, to at least the business subscribers of both telephone companies, to ascertain through first hand information the sentiment for or against consolidation.

(8) The result of consolidation of competing plants in other cities.

Rate Reduction in New Jersey.

The New York Telephone Co. has announced that on September 1 it will put into effect a new schedule of rates for measured telephone service in New Jersey, which will benefit more than 20,000 subscribers.

The rate reductions called for by the revised schedule affect private branch exchange telephone service, individual line measured service, where from 600 to 1,500 messages are used in a year, and all two-party line measured service. These reductions, together with certain cuts in local and interstate toll rates, will mean a total saving to telephone users of approximately $100,000 annually.

The pending revised schedule is the result of a study of New Jersey telephone conditions which was made by the New York Telephone Co., with the assistance and cooperation of the engineer of the New Jersey Public Utilities Commission.

The New Jersey territory affected by the new schedule includes the central office districts of Arlington, Bayonne, Harrison, Hoboken, Jersey City, Webster, Bergen, Market, Branch Brook, Waverly, Mulberry, Union, Bloomfield, Elizabeth, Glen Ridge, Milltown, Montclair, New Brunswick, Orange, South Orange, Passaic, Paterson, Perth Amboy, South Amboy, Plainfield and Verona.

Investigation of Bell Company, in Detroit.

A most searching investigation of the affairs of the Michigan State Telephone Co. is authorized in instructions issued by City Controller George Engel and Corporation Counsel Harry J. Dingeman to Edward P. Burch, who will represent the city in its fight against the company's petition for increased rates before the Michigan Railroad Commission.

Approximately $12,000 is involved as a retainer for Mr. Burch and the corps of assistants he has been authorized to hire in the interests of the city. Mr. Burch is authorized to ascertain:

1. The original cost of the system.
2. Cost of reproduction with new materials.
3. Cost of reproduction less depreciation. He is directed, in this connection, to furnish an analysis of the methods by which the several costs are ascertained and to give the reasons for the differences, if any.
4. Original costs of lands, rights of way and terminals, aside from improvements.
5. Their present market value, together with an estimate of costs of condemnation and damages.
6. The financial arrangements of the company, including issues of stocks, bonds, etc.

Rate Increase Granted for Webster, S. D.

The Webster Telephone Co., of Webster, S. D., has been granted a net increase of 25 cents in its rates for business and residence service. The commission has also ordered an extra charge of 25 cents per month for desk telephones. The new rates are as follows:

Individual business telephone	$2.25 per month
Individual residence telephone	1.25 per month
Desk sets (additional)	.25 per month
Extension telephones	.50 per month
Extra user—business	1.50 per month
Extra user—residence	1.00 per month
Local calls from non-subscribers, per message	.05

Voluntary Physical Connection in Washington.

City Commissioner T. J. Kelly, of Everett, Wash., has received formal notification from the public service commission at Olympia of the connection of the Puget Sound Independent Telephone Co. and the Pacific Telephone & Telegraph Co., in Snohomish county, Wash. Some time ago Mr. Kelly filed a petition with the public service commission asking for an order requiring the physical connection of the two systems in Everett and a hearing relative to the petition was to have been held August 12, had not the companies voluntarily effected a connection.

Formal Transfer of Houston Home Company.

The plant and property of the Houston Home Telephone Co., of Houston, Texas, was formally transferred to the Southwestern Telegraph & Telephone Co. on July 31, following action by the city commission of Houston authorizing the sale of the automatic plant to the Southwestern company.

By order of the city commission the toll lines of the Independent telephone companies entering Houston, which

were formerly connected with the automatic company, have been given connection with the Southwestern company. The Texas Telephone Co. has opened a toll office in the city.

Increase in Rates Ordered at Friend, Neb.

The Nebraska State Railway Commission has issued an order authorizing the Lincoln Telephone & Telegraph Co. to put into effect the following increased schedule of rates at Friend, Neb.: Business telephones, $2.50 per month with an added charge of $1.00 when the service is used by two parties; resident telephones, $1.50 and $1.25 per month; farm lines, $1.50 per month. The company will also be allowed to make an extra charge when the lines are carried outside the city limits.

Rate Increase at Stromsburg, Neb., Appealed to Court.

Victor Wilson, of Stromsburg, Neb., has filed an appeal from the recent order of the Nebraska Railway Commission which granted the Polk County Telephone Co., of Stromsburg, an increase in rates.

Mr. Wilson claims that the franchise granted by the city, which included in it the rate to be charged for telephone service must stand and that the state railway commission has no authority to allow a change in the rates of the company.

Physical Connection in Indiana Denied.

The Indiana Public Service Commission has issued an order denying the petition of the Pike County Telephone Co., which sought to obtain a physical connection with the Flint-Kyle Telephone Co. The petitioning company operates in Pike, Monroe and Washington counties, and it desired the Flint-Kyle company to connect with its lines in Daviess county. The commission's order recites that the connection is not a public necessity and that the patrons have adequate service under the present arrangement.

Rate Reduction Authorized for Brainerd, Minn.

The Minnesota Railroad & Warehouse Commission, on August 16, issued an order granting the petition of the Northwestern Telephone Exchange Co. for permission to reduce its rates at Brainerd, Minn. Under the order the rates for party line service are reduced from $1.75 to $1.50 per month.

Summary of State Commission Hearings and Rulings.

ARIZONA.

September 15: Hearing in regard to complaints against the rates and charges of the Mountain States Telephone & Telegraph Co., in Tucson, Ariz.

September 22: Hearing in regard to complaints against the rates and charges of the Mountain States Telephone & Telegraph Co., in Flagstaff, Ariz.

CALIFORNIA.

July 24: The commission dismissed the application of the Home Telephone & Telegraph Co., of Santa Barbara, for permission to renew a promissory note in the amount of $5,000, the subject matter having been covered in a supplemental order issued in application No. 1612 on July 20. Case No. 1791.

July 29: Application of the Pacific Telephone & Telegraph Co. for permission to install telephone plant at Slatington, Cal., dismissed, the subject matter having been informally adjusted. Case No. 1801.

ILLINOIS.

August 19: In the case of the Assumption Mutual Telephone Co. against the receivers of the Central Union Telephone Co. and the Assumption Telephone Co., the Assumption Telephone Co. is ordered to permit a physical connection with the Assumption Mutual for toll service over the Central Union, the expense to be borne by the Mutual company and the connection to be made within 60 days.

August 19: The Forest City Telephone Co. given permission to increase rates of service at Forest City and San Jose, Ill.

August 19: Intercorporate contract for exchange of property, division of territory and physical connection between the Mississippi Valley Telephone Co., of Carthage, and the reorganization committee of the Western Illinois Telephone Co., approved.

August 19: Contract to operate jointly and maintain the Burnside exchange, agreed to by the Mississippi Valley Telephone Co., of Carthage, and the Burnside Telephone Exchange, approved.

August 19: Inter-State Independent Telephone & Telegraph Co. given permission to establish new and higher rates at Hampshire, Mohena and Frankfort, Ill.

August 23: Hearing in Chicago on application of the Polo Mutual Telephone Co. for authority to increase rates between Polo, Ill., and various towns in that vicinity.

August 24: Hearing in Chicago on complaint of Charles D. Savage, of Streator, Ill., against the Streator Telephone Co. for refusal of company to install telephone.

September 28: Postponed hearing on the petition of the DeKalb County Telephone Co., of Sycamore, Ill., for an increase in rates. This action was taken for the purpose of giving the telephone experts of the commission an opportunity to review the inventory submitted by the company's officials.

INDIANA.

August: The commission denied the petition of the Pike County Telephone Co. for an order requiring a physical connection between its lines in Daviess county and those of the Flint-Kyle Telephone Co. The commission held that the connection is not a public necessity and that the patrons have adequate service under the present arrangement.

MARYLAND.

September 8: Hearing on the investigation into the rates, rules and practices of the Chesapeake & Potomac Telephone Co. in the state of Maryland.

MICHIGAN.

August: Application filed by the Citizens Telephone Co., of Grand Rapids, for permission to advance its business rates at Lansing, Mich., from $33 to $36 and its residence rates from $22 to $24.

September 1: Hearing in regard to objections to the proposed increase in rates in Detroit by the Michigan State Telephone Co.

MINNESOTA.

August 16: The Northwestern Telephone Exchange Co. has been authorized to reduce its rate for party line service at Brainerd, Minn., from $1.75 to $1.50 per month.

NEBRASKA.

August: Lincoln Telephone & Telegraph Co. authorized to increase its rates at Friend, Neb.

OHIO.

September 8: Hearing in regard to the complaint of Wm. A. Shafer asking that the Cincinnati & Suburban Bell Telephone Co. be compelled to connect with the Hamilton (Ohio) Home Telephone Co. for the purpose of giving toll service to Cincinnati.

OREGON.

November 1: Hearing on application of the Coos & Curry Telephone Co. and the Coquille Valley Telephone Co. for permission to increase their rates at Coquille, Ore.

SOUTH DAKOTA.

August: Webster Telephone Co., of Webster, S. D., authorized to increase its rates for business and residence service 25 cents net.

WASHINGTON.

August: The Puget Sound Independent Telephone Co. and the Pacific Telephone & Telegraph Co. have voluntarily effected a physical connection between their systems in Snohomish county, Wash. Some time ago a petition was filed by the city commissioner of Everett, Wash., asking for an order requiring a physical connection between the systems of the two companies in Everett and a hearing was to have been held August 12 relative to the matter.

September 1: Hearing relative to proposed consolidation of the two telephone exchanges in the towns of Hanford and White Bluffs, Wash.

WISCONSIN.

August: Grange Hall Telephone Co., of Pierce county, ordered to discontinue subscribers on lines recently extended by it into the territory served by the Highland Telephone Co., of Rock Elm, Wis., within one month from the date of the order.

August: The commission has dismissed the complaint of the Western Crawford County Telephone Co., which alleged that the Union Telephone Co. at Prairie du Chien, Wis., had constructed lines in the territory of the Western Crawford company without serving notice upon it. In an extended opinion the commission holds that there is little, if any, harm done to the complainant, and "that the persons served by the line have a clear need of the telephone service thus afforded which could not be satisfied by the complainant."

Practical Subjects—Letters and Discussions

An Invitation to San Diego.

Members of the Independent Telephone Association of America.

Greetings:

The editor of TELEPHONY has kindly granted me space in its columns to invite you individually, and as an organization, to come to San Diego this year when you have had your fill of convention business in San Francisco. A visit to San Diego and her perfect gem of an Exposition will put the finishing touch to your picture of California which would otherwise be incomplete.

Come here, and learn the answer to the question, "Why two Expositions?" whether or not you have already heard it from thousands who, through curiosity at San Diego's daring, came, saw, and were conquered.

Even as San Diego has placed her name before the world by the startling achievement of her independent Exposition, so has the Independent San Diego Home Telephone Co., in its own way, attracted considerable attention in the world of telephony by the inauguration of its recent profit-sharing policy. This unprecedented plan provided for the prorating to the subscribers of all profits earned by the company in excess of 3 per cent. on the capital stock. This experiment is working successfully, and is bringing in many new subscribers who appreciate the extra advantages this adds to our already superior automatic service.

So the San Diego Home Telephone Co. invites you to come and investigate what it is doing to further the science and practice of telephony. And San Diego, her Exposition and her Chamber of Commerce summon you to gaze upon her beauty, partake of her hospitality, and witness the achievement of a once sleepy, care-free village, basking in the sunshine of a perfect climate and romantic, half-Spanish traditions, which, suddenly awakened, in four years doubled its population and built an Exposition, which, in lasting charm and perfect beauty, exceeds anything of its kind ever before attempted.

Yours very cordially,

(Signed) Charles E. Sumner, President,

San Diego, Cal. San Diego Home Telephone Co.

Promoting Greater Economy in the Use of Dry Cells.

The recent advances in the cost of dry batteries has resulted in efforts on the part of telephone companies to be more economical in their use. With a view to promoting greater economy in the use of dry cells the Ohio State Telephone Co. has prepared and sent out to its various exchanges and connecting companies a circular on the proper care and economical use of dry batteries in telephone practice. The circular reads as follows:

"Stocks of dry batteries should be sized to permit use within a period of 30 days.

Dry cells with cracked or bulged seals and leaky or sweating cells should be set aside and not installed, and reported to the purchasing agent for action looking to credit for them.

Care should be exercised to store batteries in a cool, dry, and clean place out of influence of sunlight, of steam pipes, or other source of heat, and of condensation of moisture. The cells should stand on their bottoms. Lying on the side tends to weaken them.

In installing dry batteries regard should be had for the points raised as to storage, particularly as to the selection of a clean, dry place. The cells should be kept upright, and not crowded together. Battery boxes and shelves should be kept free of salty deposits or moisture from previous installation. To avoid possible short-circuits in batteries on shelves or in boxes, the first row should be set with the zinc terminals to the wall, the second row having these terminals away from the wall. If more than one row is used, a one-inch wood strip should be placed between each two rows and the batteries properly arranged with reference to the terminals.

For connecting dry cells insulated connectors and wires, and not bare wires, should be used. Those connected together should be placed so that the binding post on the zinc may not be in contact with the side of the adjoining cell. Such metallic contact short-circuits and ruins the cell.

Pole changer battery may be saved by cutting out battery by means of a switch in times of low traffic and starting when ringing current is needed. Extra starting contacts on ringing keys are likely to make poor rings and are not recommended. Pole changer battery consumption may be reduced where pulsating current for selective ringing is not required, by setting two pulsating springs (those on each side nearest the back board) so that the pendulum operates only four ringing springs instead of six.

Certain pole changers are said, by reason of their high vibrator resistance, to operate on battery of very low amperage, and accordingly batteries that have been discarded as unfit for telephone or other high resistance service, may be efficient for pole changer use, provided the voltage is high enough.

All batteries displaced by new cells should be returned to the storeroom or shop. Such batteries should receive careful handling until it has been determined whether or not they are fit to be re-issued.

Suitable facilities should be provided for testing. All batteries returned, particularly from places where used in large quantities, as for pole changers, private branch exchanges, testing devices, etc., should be tested for amperage and examined for broken terminals. In connection with the present practice in some places of bringing batteries almost worn out from long distances, when the troubleman may be near in order to save future expense of renewal, there may be economy in utilizing such batteries at places near the exchange. Batteries testing eight amperes or better, otherwise in good condition, should be properly marked and re-issued for use with residence telephones. Others of low amperage, but of sufficient voltage, may be used with pole changers as previously stated, if practicable. Broken terminals in usable batteries should be repaired. This is done with better economy in large lots. The junk value of worn out dry batteries at Columbus is 65 cents a hundred. The question of record of batteries in service to safeguard against theft or other loss should be carefully gone into."

A Suggestion for Increasing Main Line Service.

About eight months ago the local commercial office in a city in central Iowa began to make a study of local service conditions and requirements in places of business, which apparently needed more telephone lines and service, and were not aware of the fact.

In this same connection the local traffic department rendered valuable co-operation with respect to furnishing names of business houses that frequently had busy calls, etc.

A small amount of newspaper advertising was done in this same connection, suggesting this idea and the plan for giving subscribers intelligent information as to number of "busy calls." One of the advertisements used, read as follows:

"Trade follows the line of least resistance and the man who

makes it easy for people to deal with him will get the most trade.

Customers who find your clerk too busy to wait on them may never come again.

The customer who telephones and frequently gets the reply 'line is busy' may never give you that order.

The busy telephone is like the busy clerk—it is asked to do *Too Much.*

If you are losing valuable orders because you haven't adequate telephone facilities, you want to know about it, don't you?

We keep a record which shows the number of times your lines are found 'busy' each day and we will gladly give you this information upon request.

Call our Local Business Office, telephone No. 500, *Today."*

This was published once each week in the two local daily newspapers for one month. We also had a "busy call" record kept, for five days each, for a number of firms. These records were taken to the managers of the various firms and explained. The suggestion was also made that the telephone company believed the information of sufficient importance to warrant the addition of more main line service to their places of business. An invitation was extended to visit our exchange, so we could show them how the busy calls were registered automatically and that our report was reliable. In many cases the invitation was accepted.

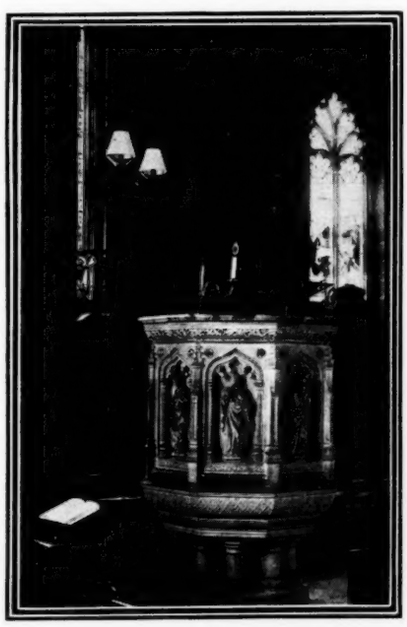
The results obtained to date, traceable to this source of information, are as follows:

1. Increase in number of trunk lines for P.B.X. service 18
2. Increase in number of main business lines..... 11
3. Annual increase in exchange revenue earnings.....$1,140

Church Service by Telephone.

Subscribers to the Guernsey Telephone Department, on the island of Guernsey in the English Channel, are enabled to listen to the church service in their homes any Sunday evening at a charge of five pence (10 cents). Police and firemen, as well as lighthouse keepers and other government employes who are prevented by their occupation from getting to church, may have the telephone service free of charge.

In the accompanying illustration are shown a group of Guernsey militiamen on outpost duty five miles from town, listening to the service in the St. Peter Port Town Church. At Platte Fougere lighthouse station sometimes as many as eight people sit down together to hear the telephone service from a church five miles away.



Pulpit of St. Peter Port Town Church Showing Transmitter—Guernsey Militiamen Listening to Church Service.

Trouble on a Grounded Line.

We had a very unusual case of trouble recently. That is, it was common trouble, but it happened in a very funny way. On one of our grounded lines, about eight miles from town, the wire passed over a farmer's house. This farmer had two industrious young sons who at this particular time were trying to start a gasoline engine.

The engine would not run so they decided the batteries were no good. Their next idea was to start the batteries with the electricity on the telephone line, so they connected a wire to the line and to the engine. When they found that the engine would not run with that, they decided it needed a good ground wire. Therefore they buried some wire in a good wet place and connected it to the engine. As the engine would not run connected that way, they decided it was no good and went away disgusted.

I was very much surprised when I found the trouble and thought it very cute of the youngsters.

C. J. Ridge, Treasurer.
Twisp, Wash. West Side Telephone Co.

Winter is Best Time to Solicit Rural Business.

A solicitor making the rounds of the downtown office buildings in the interest of one of the local telephone companies, at Louisville, Ky., seeking additional names to be inserted in telephone directories where one telephone station is maintained, spoke of having had most of his experience with the country users of telephones. Upon being asked why he was diverting his efforts to the city, he stated that the summer is the worst time in the year to go after rural business.

"I always select the worst possible winter weather," he said, "when I go out after new business in the country. It is rather rough on the solicitor, that is true, but on the other hand he gets more business, because he can count almost always on finding people at home. In the summer the men of all the families are generally out in the fields and it takes much time to find them, while after you do find them they hardly ever have time or disposition to stop to talk to you. The dull period in the cities, however, is in the summer, and I go where things are dull to get business."

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, Written by J. C. Kelsey and S. R. Edwards

Quiz Questions on the Preceding Installment.

51. What are essential points which should be included in a charter?

52. Outline the steps to be taken in obtaining a charter.

53. Why should a charter be broadly drawn?

54. State some considerations having a bearing in deciding upon the state in which to incorporate.

55. What is the general practice in regard to selecting the state in which to incorporate?

56. Which are known as the liberal incorporation states? What are the difficult states?

57. State some of the advantages of the so-called easy incorporation states. Summarize the disadvantages.

58. Name some of the disadvantages of the so-called rigid states in regard to incorporation.

CHAPTER V. The Incorporation of a Company. (Cont'd).

59. *A Minnesota Certificate of Incorporation.*—The following is a copy of a certificate of incorporation of a Minnesota company which illustrates many of the points which have been discussed:

CERTIFICATE OF INCORPORATION OF ——— HOME TELEPHONE CO.

We, the undersigned, for the purpose of forming a corporation under and pursuant to the provisions of Chapter 58 of the Revised Laws of Minnesota for 1905 and any amendments thereof, do hereby associate ourselves as a body corporate, and do hereby adopt the following certificate of incorporation:

ARTICLE I. The name of this corporation shall be ——— Home Telephone Co. and the general nature of its business shall be the leasing, constructing, maintenance and operation of telephone lines of communication in, or connecting, towns or villages of less than two thousand inhabitants within the state of Minnesota and for the purposes thereof, to buy, sell, lease, hold and improve necessary lands and tenements, and to have, hold and possess all rights, privileges and powers conferred upon telephone companies by the laws of the state of Minnesota. The principal place of transacting the business of this corporation shall be ———, county of ———, in said state, and the general offices of said corporation shall be maintained at said ———.

ARTICLE III. The names and places of residence of the persons forming this corporation are: F. E. Doe, J. H. Roe, and John Doe, all residing at St. Paul, Ramsey county, Minnesota.

ARTICLE IV. The management of this corporation shall be vested in a board of directors composed of three members. The names and addresses of the members constituting the first board of directors are: F. E. Doe, J. H. Roe and John Doe, all residing at St. Paul, Ramsey county, state of Minnesota. The first officers of this corporation shall be F. E. Doe, president; John Doe, vice-president; J. H. Roe, secretary, and F. E. Roe, treasurer; all said officers and directors shall hold their respective offices aforesaid until the next annual meeting of the corporation to be held at said ——— on the second Monday in April, A. D. 1915, at which time and place and annually thereafter, a board of directors shall be elected from and by the stockholders of this corporation.

The annual meeting of this corporation shall be held at its principal place of business on the second Monday in April in each year. Immediately after the election of directors, or as soon thereafter as practicable, the directors shall meet and elect from their number, a president and vice-president, and from their number, or from the stockholders, a secretary and a treasurer, but any office, except that of president and vice-president, may be held by one person.

The directors and officers of this corporation shall hold their respective offices until their successors have been duly elected and enter upon the discharge of their duties. The first meeting of the stockholders shall be held at ——— aforesaid on the second Monday in August, 1915, at 11:00 in the forenoon.

ARTICLE V. The amount of the capital stock of this corporation shall be Five thousand dollars ($5,000) which shall be paid in, in money or property, or both, in such manner, at such times, and in such amounts as the board of directors shall order. The capital stock shall be divided into one hundred and twenty (120) shares of common stock of the par value of Twenty-five Dollars ($25) per share and eighty (80) shares of preferred stock of the par value of Twenty-five ($25) Dollars per share.

The preferred stock shall be entitled to receive annual dividends out of the net earnings, properly applicable to that purpose, at the rate of six per cent. per annum, and this dividend shall be cumulative. The common stock shall be entitled to receive, such annual dividends out of the net earning properly, applicable to that purpose, as the board of directors may from time to time by resolution direct. No dividends shall be declared or paid on common stock of this corporation until the preferred stock shall have received the dividend hereinabove provided for.

ARTICLE VI. The highest amount of indebtedness or liability to which this corporation shall at any time be subject shall be the sum of Five Thousand Dollars ($5,000).

IN TESTIMONY WHEREOF, the undersigned have hereunto affixed their hands and seals at ———, Minnesota, this 22nd day of May, A. D. 1915.

F. E. Doe, (Seal.)
J. H. Roe, (Seal.)
John Doe, (Seal.)

In the presence of Henry Jones and James Smith.
(Revenue Stamp of 10c affixed and cancelled.)

STATE OF MINNESOTA, County of Ramsey.—ss.

On this 25th day of May, A. D. 1915, personally came and appeared before me F. E. Doe, J. H. Roe and John Doe to me known to be the persons named in and who executed the foregoing certificate of incorporation, and each acknowledged that he executed the same as his free act and deed for the uses and purposes therein expressed.

John Jones.
Notary Public, Ramsey County Minn. My commission expires July 18, 1821. (Notarial Seal.)

STATE OF MINNESOTA, Department of State.

I hereby certify that the within instrument was filed for record in this office on the 25th day of May, A. D. 1915, at 11:00 o'clock a. m., and was duly recorded in Book A-4 of Incorporations on page ——

Julius A. Schmahl,
Secretary of State.

59059

REGISTER'S OFFICE, Washington County, Minn.—ss.

I hereby certify that the within instrument was filed in this office for record on the 25th day of May, A. D. 1915, at 1:30 o'clock p. m., and was duly recorded in book "O" of Bonds, on page ——.

A. W. Magnuson,
Register of Deeds.
By Reuben C. Peterson, Deputy.

CHAPTER VI. The Corporate Organization.

60. *Management of a Corporation.*—Up to this time nothing has been said relative to the make up or composition of a cor-

poration. Legally, it is an artificial being. Stockholders have, however, been referred to as the owners of an incorporated enterprise, while directors and officers have been mentioned.

A corporation, being an artificial person, has to be managed. Theoretically, it is managed by the stockholders. The stockholders, however, are usually too numerous to exercise managerial powers and therefore delegate their authority to a small body, called the board of directors, to act for them. The directors in turn elect officers who carry out the instructions of the directors.

61. *The Two Managerial Units.*—The management of a corporation is divided into two units or sections. One is the corporate organization and the other is line organization. The corporate organization is made up of the stockholders, directors, committees and officers, and it directs the financial and general policies of the company. The line organization has charge of the actual carrying on of the business.

The connecting link between these two units is the general manager who has charge of the operating organization of the corporation. We are, however, not at present concerned with the line or operating unit, as that will be taken up in another part of "Fundamental Principles of the Telephone Business" under the title of "Organization and Management." It might be stated that officers of the corporate organization are frequently members of the line organization; for instance, the secretary of a telephone company is often the manager also.

62. *Theory of Corporations.*—The theory of corporations is that no plenary power is granted to any individual. The management is vested in a board of directors. Directors have power but, collectively, no director can do any more than the smallest stockholder, as an individual. No director can bind the company. It may be said that ordinary control may be vested in the president, but supreme control belongs to the board of directors.

A corporation and its stockholders are separate and distinct persons. There is no interest between them and the corporate creditors, for a stockholder's liability is to the corporation alone. And it is only in this way that an estate can be reached, except in case of an unpaid stock subscription. If the stock is paid in full, the stockholder cannot be held. Corporations have right of action against stockholders only for unpaid subscriptions. No dividends must be paid which are not earned, for the capital stock of the company must never be impaired. How many companies are guilty of paying dividends at the expense of the capital stock?

63. *Stockholders and Their Rights.*—A stockholder in a corporation is a sort of an irresponsible party. He cannot bind the other stockholders or the company by any action on his part. He has a right to share in the management of the corporation only so far as casting a vote at the annual meeting for directors. Usually the slate is already prepared for him and it does not matter whether he votes or not. It is said that 30 per cent. of the stock of the average corporation will control it indefinitely.

The stockholder can vote also on by-laws, amendments, increase of stock, issue of bonds and matters pertaining to the enlargement or shrinkage of the business. Ordinarily speaking, when one puts up $100 for a share of stock, he gets a certificate, a receipt for his money, which promises absolutely nothing. In general, the rights of stockholders as a body are:

To elect directors.

To amend the charter or by-laws.

To sanction or veto the selling or mortgaging of the permanent assets of the corporation.

To dissolve the company.

64. *Rights of the Individual Stockholder.*—Individually the stockholders have some rights which have not been specifically mentioned, it having been taken for granted that they are generally understood. These individual rights of stockholders may be summarized as the right:

To receive notice of all stockholders' meetings and, of course, to participate in them.

To share in the dividends declared by the directors in proportion to stockholdings.

To inspect the accounts of the company.

Proper notice of the stockholders' meetings must be written or printed and mailed to each stockholder to the address as it appears on the books of the company. The sending of this written notice may be waived by stockholders upon signing a form waiving the notice and agreeing in it to the time and place of the meeting. The law requires that reasonable notice be given of the first stockholders' meeting of a new corporation. If this is not done, the business transacted is void unless the waiver notices have been obtained.

The books of a company may show satisfactory earnings, but the stockholders cannot get them until dividends have been declared by the board of directors. The directors alone have the power to declare dividends and may withhold distribution of the earnings to stockholders for considerable periods. The stockholders cannot prevent such action as courts will not, as has been previously pointed out, interfere unless fraud or mismanagement can be proved.

65. *Publicity of Accounts.*—Actual inspection of a company's books is more a theoretical than a practical right. It was formerly quite generally acknowledged as a stockholder's right, but in recent times this opinion has been greatly modified. One reason for this change of opinion is that officials of a company could by purchasing a share of stock in a rival corporation obtain information from its books which could be used against it in a business way.

It is contended that the information given in profit and loss statements and on balance sheets furnish all the data which rightfully belongs to the stockholder. The report requirements of the various state utility commissions and the Interstate Commerce Commission provide stockholders another source of information. These report requirements also tend to bring about a greater general publicity of accounts.

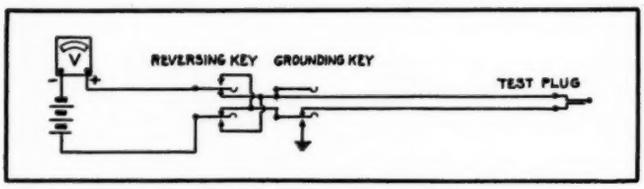
66. *Liability of a Stockholder.*—Reference has already been made to the liability of stockholders being limited to the amount of the par value of their stockholdings. It sometimes happens that stock is paid for on an installment basis and that after two or three installments are paid, no more capital is required. Some of the original stockholders sell out and later the company fails. The creditors may then hold the later stockholders for the amount still unpaid upon the original stock subscription no matter what price was paid for the stock. It is therefore well to make certain that all stock certificates are marked "fully paid and non-assessable." *(To be Continued.)*

Queries on Theory and Practice

Testing Ground Return Lines with Voltmeter.

We are thinking about making a testing outfit for use in the office for testing on grounded rural lines. We aim to use a voltmeter and a bank of dry cells for testing. Do you think this practical for use on such lines? If so, please give diagram of connections and formulas for using the outfit.

Yes, it is practical to use a voltmeter for testing ground return rural lines. You cannot measure insulation, for each bell forms a leak which prevents the real insulation of the line from being measured. But you can use it for quickly



Method of Connecting Voltmeter for Testing.

measuring resistance, and this will be of value in detecting trouble. While the lines are in good condition, take readings on their resistance and record their values; also take and record the resistances with a receiver off the hook at one or two points. This record will be of use in testing when trouble comes on.

When a line measures markedly low in resistance, it is evidence that it is grounded somewhere, by a line ground or by one or more receivers off the hook. Room noises can often be relied upon to detect the latter condition. If a line measures higher in resistance than normal, it indicates a break, cutting off some of the stations. A swinging ground shows itself by the voltmeter needle standing at or near its normal deflection for that line and periodically jumping to a higher value (whenever the wire swings into ground). A swinging open on a line indicates itself by the needle standing at normal and periodically swinging down toward zero (whenever the line opens). A little practical experience will enable you to get much valuable information from the voltmeter's behavior.

Connect the voltmeter as shown in the accompanying illustration. If you have any metallic circuits, test across a pair by leaving the keys normal. For grounded lines throw the grounding key, which tests to tip of plug. The reversing key is to be used if there is enough earth potential or earth current to give error. Take the average of the two readings.

Charging Storage Battery from Lighting System.

I wish to know how to connect a storage battery to a 240-volt direct current lighting system so as to store current during the night for operating a six-volt motor and a five-bar bridging generator. Wish to use this instead of pole changers for ringing on magneto bridged telephone system.

It is rather inefficient to charge a six-volt storage battery directly from a 240-volt source. You would pay for all the energy represented by the 240 volts multiplied by the current used. For example, if the battery has a storage capacity of 60 ampere-hours, your charging rate would probably be 10 amperes for eight hours. The total energy actually put into the battery would be approximately 540 watt-hours, which at 10 cents a per kilowatt-hour costs 5.4 cents. But if you charge the battery from the 240-volt source, regulating the current with a bank of twenty 32-candle power carbon lamps, the total energy will be 19,200 watt hours, or 19.2 kilowatt-hours, costing $1.92. Of course, if this expense is no item, connect the lamps in parallel with each other, then place this group in series with the battery to be charged, taking care that the positive battery terminal is connected to the positive terminal of the 240-volt source. If you don't care if your lights dim down a little, you can economize somewhat by connecting the storage battery in series with the lights in the building.

A much better plan is to buy a 240-volt direct current motor and let it run the magneto generator.

Trouble From Motor of Power System.

We have a serious case of trouble in our exchange and would kindly ask that you give us a remedy for it.

In the first place, we have a common return system, with grounded lines in the country. We have a lead of about 50 wires running in an alley, on the other side of which an electric light company has a high tension line carrying about 23,000 volts. The electric light wires are from ten to fifteen feet higher than our wires and we have never had any trouble with our lines until the electric light company recently installed a motor in a business place where we have a telephone. Our drop going into this building is No. 19 twisted pair and about 15 feet from the drop of the light company, which has two circuits running into the building, one for lights and the other for the motor.

Every time the motor is started, our grounded lines running through this alley in particular, also some of our common return circuits, start to sing, and one can distinctly hear the motor running over these lines in question. All of the drops off the pole where the drop goes into the business place in which the motor is installed, are of twisted pair and insulated wires. Just for an experiment, we took the drop off which goes into the building in which the motor is located, while the motor was running, but that did not reduce the noise any. All of the drops off the pole close to this business place are common return circuits and all insulated wires.

It may be that the motor in question has its winding grounded at some point. This will cause considerable noise to come onto parallel grounded telephone lines. We suggest that you have the motor tested and the trouble cleared. It is no advantage and even a danger to the motor itself to have its coils grounded.

A Case of Sneak Ringing Trouble.

I have a case of what I call sneak ringing, which I have been unable to locate and is giving me a good deal of trouble. I have about 60 private lines and 15 rural lines which enter a cable at a pole box. The cable is 50 feet in length.

What I mean by sneak ringing is that if I ring out on the line, the ring will come in on a telephone on another line. The trouble usually occurs on private lines and does not show a cross or throw the drop on any other line at the switchboard. The ring is not as distinct, however, as on the line I am ringing on. All my lines are grounded.

Your sneak ringing looks much like a case of leakage through common ground wires. It may be the common ground at the switchboard, or at the end of the cable, if you use one pair for each line, grounding the mate wires. A telephone bell will ring when a drop will not fall, so this may explain your observation as to the drops.

We suggest separating the ground connections of the lines which the ring crossed, by giving them separate ground rods for a test. If it clears the trouble, you will need to make a better earth connection. It may be due to a high resistance joint in the common ground wire, as well as insufficient contact with moist earth.

Long Distance Service Over Postal Lines is Extended.

Long distance service was recently established over the lines of the Postal Telegraph-Cable Co. between Washington, D. C., and points as far south as Raleigh, N. C.

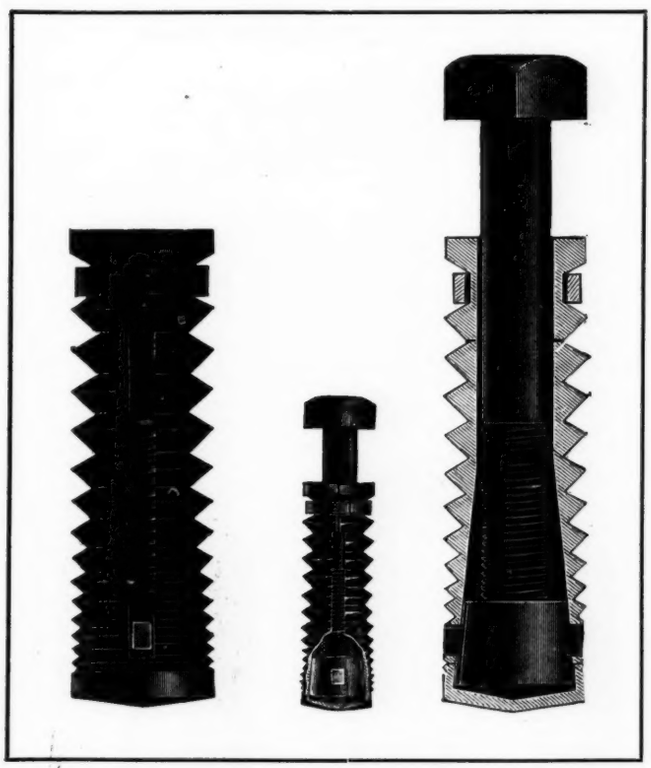
From Factory and Salesroom

Convention: Indiana Independent Telephone Association, Indianapolis, September 15 and 16

O. K. Expansion Case Bolts and Toggle Bolts.

In telephone work it is frequently necessary to attach fixtures and equipment to concrete, brick or stone masonry. Various methods for doing this have been tried out and it has been found that expansion bolts are most useful and efficient for this purpose. O. K. expansion bolts secure expansion in all directions from the center to the surface, thereby bringing all parts of the case in contact with the sides of the hole in which the case is held and giving the largest amount of frictional contact possible. This, in combination with the means used to expand the case, the well known wedge and screw power combined, makes the fastening absolute. The nut is enclosed within the case, as is shown in one of the accompanying illustrations, and cannot be displaced or lost, in use or otherwise.

As the guide of the bolt to the nut is perfect, connections are never missed or delays caused by the failure to enter the

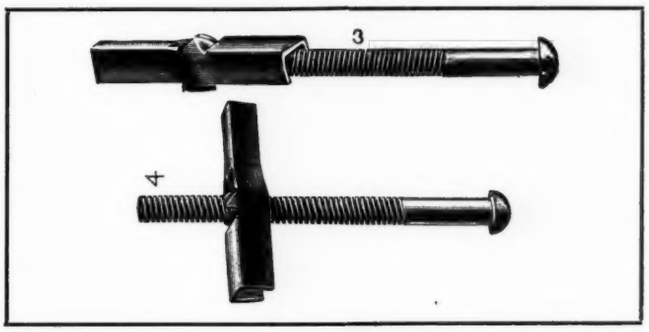


O. K. Expansion Case Bolts.

nut and catch the thread. The case re-enforces the nut and the contact of the case with the sides of the hole, either brick or stone, re-enforces the case, thereby adding great strength. All that is required to apply the bolt to use is a hole in the brick or stone work, a little larger than the outside of the case, so that the case containing the nut may be inserted therein. The fixture or equipment to be fastened is then put in place, the bolt put through it into the case and the bolt turned the same as in ordinary cap screws, until the desired tension is obtained. The equipment can be taken down and the case and nut removed by slacking the bolt and driving the nut back to the bottom of the case and then removing the bolt and hook from the case, which can be easily done when the nut is at the bottom of the case.

This method of fastening does away with the use of lead, brimstone, cement and wood plugging. It will be readily seen that the saving of time will pay for the improved method to say nothing about the more perfect fastenings. The O. K. expansion bolts can be used in all kinds of weather and in all positions where lead, brimstone and cement cannot—that is, in overhead fastenings. O. K. expansion bolts are made in various styles and sizes.

The manufacturer also makes a simple but efficient toggle bolt that affords great holding power and convenience of in-



The O. K. Toggle Bolt.

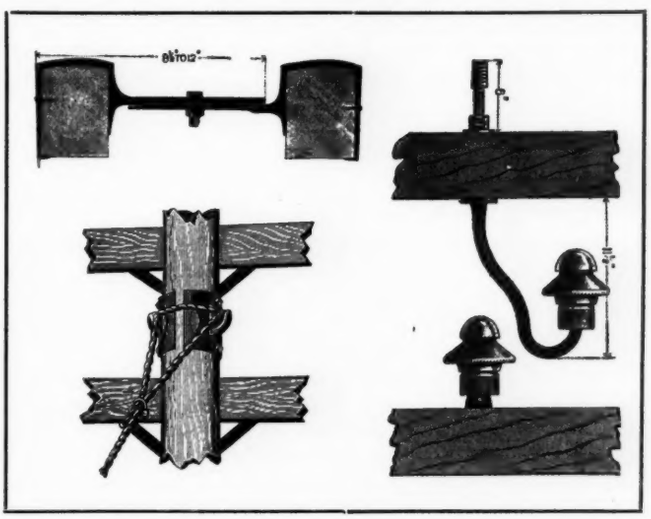
stallation wherever toggle bolts are preferred. Further particulars relative to these expansion bolts may be obtained by application to the manufacturer, Isaac Church, South Norwalk, Conn.

Garford Magneto Switchboard for Pierce, Neb.

The Pierce Telephone Co., of Pierce, Neb., recently placed its order with the Garford Mfg. Co., of Elyria, Ohio, for a new 300-line magneto switchboard. This business was handled through the Kansas City branch of the Garford company.

Fletcher Iron Construction Supplies.

In the last few years line construction practice has changed, as economy and convenience required better fixtures and methods. Where formerly wooden pins were used almost

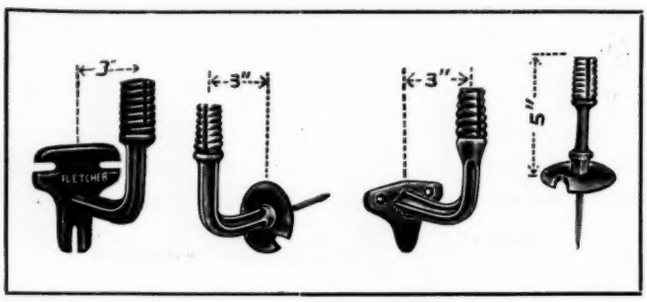


Fletcher Cross Arm Brace, Pole Shim and Phantom Bracket.

exclusively, special types of iron pins are now extensively used. The development of phantom circuits brought out the need for special transposition brackets. Various other uses of iron for pins and brackets in place of wood were found. The accompanying illustrations show some of the brackets

used in telephone and telegraph construction which have been developed by the Fletcher Mfg. Co., of Dayton, Ohio.

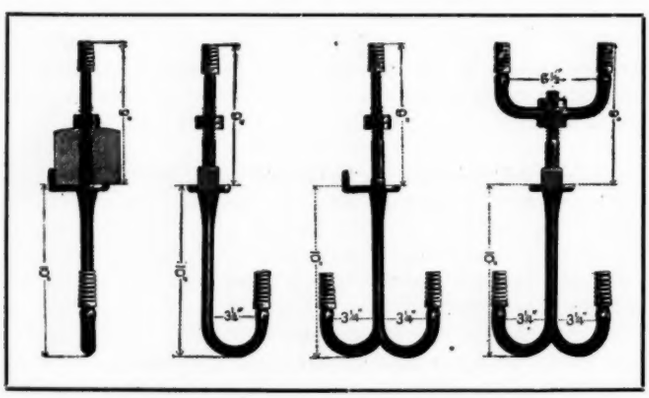
The brackets are made of malleable and grey No. 1 new iron, no scrap being used. Practical men of large experience have designed these brackets and they are made to stand up



Some New Fletcher Brackets.

under the most strenuous conditions under which they may be placed. The fixtures shown in the illustrations are used extensively by telephone and telegraph companies.

Where guy wires are placed around poles it is now customary to protect the pole from cutting by the wire by means of oblong pieces of iron, termed "pole shims." The Fletcher shim shown in one of the accompanying illustrations,



Telephone and Telegraph Phantom Brackets.

has a provision to prevent the guy wire from slipping off the shim. It is made of malleable iron, galvanized.

The Fletcher Mfg. Co. will be glad to send its latest catalog which illustrates its brackets and fixtures, to those who are interested.

Garford Installation at Morrison, Ill.

The Morrison Telephone Co., of Morrison, Ill., has just contracted with the Garford Mfg. Co., of Elyria, Ohio, for a common battery multiple switchboard, power and protective equipment and 500 subscriber sets. The Morrison company has recently undergone a reorganization, taking over the exchange and lines previously operated by the Whiteside Farmers' Mutual Telephone Co.

The new organization has already contracted for a new exchange building of brick and stone, and when completed with new equipment installed it will have one of the most modern and up-to-date exchanges in the Middle West. F. Trautwein, who was manager and principal owner of the older organization, will remain as manager of the new company.

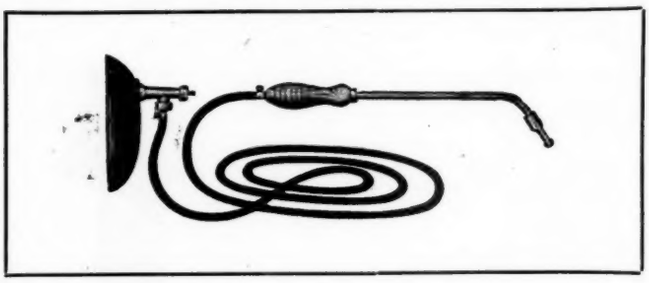
The Prest-O-Torch.

The Prest-O-Torch represents the handy, modern way of soldering and brazing. This little device solders and brazes and produces an intense flame which, it is claimed, does the work easier, quicker and better than any other device. The Prest-O-Torch is operated by connecting it to any Prest-O-Lite, by turning on the gas and lighting. The flame it produces will not oxidize the metal and will not blow out. A constant heat is supplied, thus eliminating the variation in pressure, which necessitates the continual pumping of the gasoline torch.

The torch itself is small, but it is especially handy for jobs that are hard to get at with a soldering iron or a gasoline flame for brazing. It can be coupled close with the Prest-O-Lite or used in connection with any length of rubber tubing where most convenient. Considering the large volume of work done in a short time the operating cost is exceedingly low.

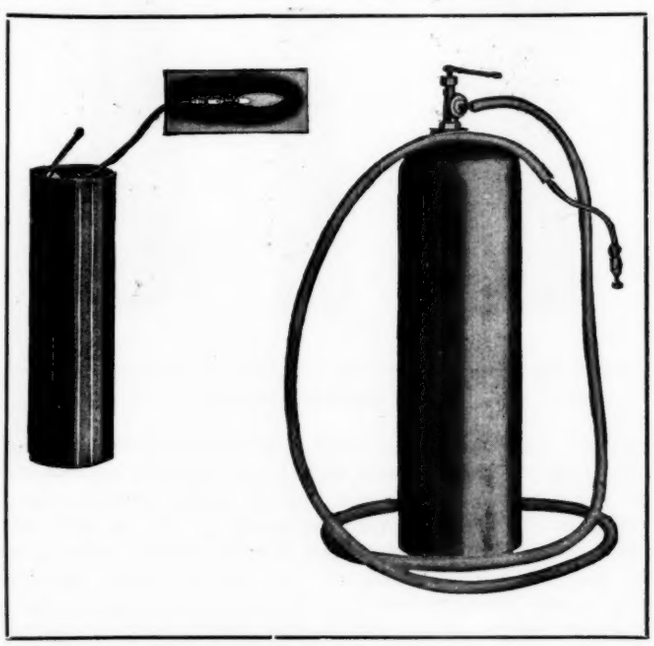
The Prest-O-Torch is being extensively used by plumbers and tinners and by telephone and electric light repairmen for brazing jobs, soldering connections, lead burning in storage batteries, etc. Engineering houses also use this torch for a wide variety of work. One large company uses it most successfully for brazing platinum contact points into steel electrodes on engine cylinders.

The convenience of the Prest-O-Torch used with the Prest-O-Lite will be readily apparent to anyone who knows the de-



Style "C" Prest-O-Torch.

lays and uncertainties involved in generating heat from gasoline outfits, especially in the open air. The safety and ease with which the Prest-O-Torch can be used in residences are factors in its favor and, perhaps, its strongest appeal to



Prest-O-Torch, Styles "A" and "B."

workmen is the concentration of an intense heat in a small, easily controlled flame.

When ready to light, the needle valve of the Prest-O-Lite is slowly turned. Only a small amount of gas is necessary, as an excessive use of gas proves not only wasteful but inefficient. A greenish white cone should be present in the flame, starting at the mouth of the torch, as shown in one of the ac-

companying illustrations. A flame with a short cone is sufficient for soldering work, while a longer flame giving more heat is necessary for brazing. The length of the flame is regulated by the needle valve at the cylinder.

In soldering, when an extra large, heavy iron is required the work may be done without a soldering iron by concentrating the flame of the torch directly upon the object to be soldered.

The Central Union Telephone Co. at Indianapolis, Ind., which has been using Prest-O-Lite gas for heating soldering irons for some time, states that the Prest-O-Torch has proved to be a big time saver in its work. In addition to using Prest-O-Lite gas for soldering, this company has found that the motorcycle size, equipped with auto headlight burner, makes an excellent light for working in underground manholes. A large searchlight may also be used for working on wires at night.

All inquiries directed to the Prest-O-Lite Co., Inc., 500 Speedway, Indianapolis, Ind., relative to the Prest-O-Torch will receive prompt attention.

Eddie Stoeffhaus Has a Ford.

It is rumored around that Eddie Stoeffhaus, president of the Rebuilt Telephone Equipment Co., Chicago, was seen the other night cutting all kinds of capers with his "new" Ford.

Mr. Stoeffhaus bids fair to become a speed driver, rivaling even Dario Resta. He has already set a new record for a 1,500-mile spurt, making it in (?) hours, but that's not so important as the fact that he closed some nice telephone business while away.

Eddie's motto is: "If others can do it, why can't I?"

Paragraphs.

THE AMERICAN ROLLING MILL CO., of Middletown, Ohio, in a bulletin, "A Journey to Armco Farm" brings out many uses of Armco iron. Among them may be mentioned lath made of Armco iron, iron window frames and sashes, tin roofing and shingles, the use of Armco iron for culverts, water tanks and siding in clapboard, brick or stone style. The bulletin which is attractively gotten up will be sent to interested persons.

Record of Telephone Patents Recently Issued

1,144,997. July 6, 1915. SEMI-AUTOMATIC EXCHANGE SYSTEM; A. M. Bullard (deceased), assigned to Western Electric Co. The feature of this system is the combination with a set of number keys, of a primary sender and a subsidiary sender each having a set of locking relays corresponding to the keys. The depression of keys representing a number locks up corresponding relays of the set associated with the primary sender. The remaining relays of that set are also rendered unresponsive to the key. Means responsive to the locking relays of the primary sender representing a complete number bring relays of a subsidiary sender under control of the key.

1,145,109. July 6, 1915. TELEPHONE SYSTEM; J. L. Wright, Cleveland, Ohio; assigned to F. C. Stevens, Attica, N. Y. In this automatic system link circuits are provided for interconnecting the line circuits. Automatic switching mechanism, responsive to calls over the line, acts to connect a calling line to an idle link. A distributing switch associated with a group of line circuits and responsive to current changes in any one of its group, selects and renders active an idle link circuit. A time controlled element acts after a predetermined interval to advance the distributing switch so as to select and designate another link exclusively for connection with the calling line.

1,145,120. July 6, 1915. TELEPHONE EXCHANGE SYSTEM; E. E. Clement, Washington, D. C.; assigned to F. C. Stevens, Attica, N. Y. In this semi-automatic system subscribers' lines terminate in branch exchanges containing normally interconnected groups of automatic switching apparatus. Two-way trunk lines connect the automatic branch exchanges with a central or clearing house exchange where means controlled by operators are provided for actuating the trunk selector switches at the branch exchanges.

1,145,152. July 6, 1915. CREDIT MARKING SYSTEM; J. J. Leidigh, Milwaukee, Wis.; assigned to National Cash Register Co., Dayton, Ohio. Credit authorizing means consisting of marking or punching apparatus is combined with a private telephone system. It is installed in stores and consists of a central station and a plurality of department stations. The credit authorizing mechanism is electrically operated over the telephone circuits.

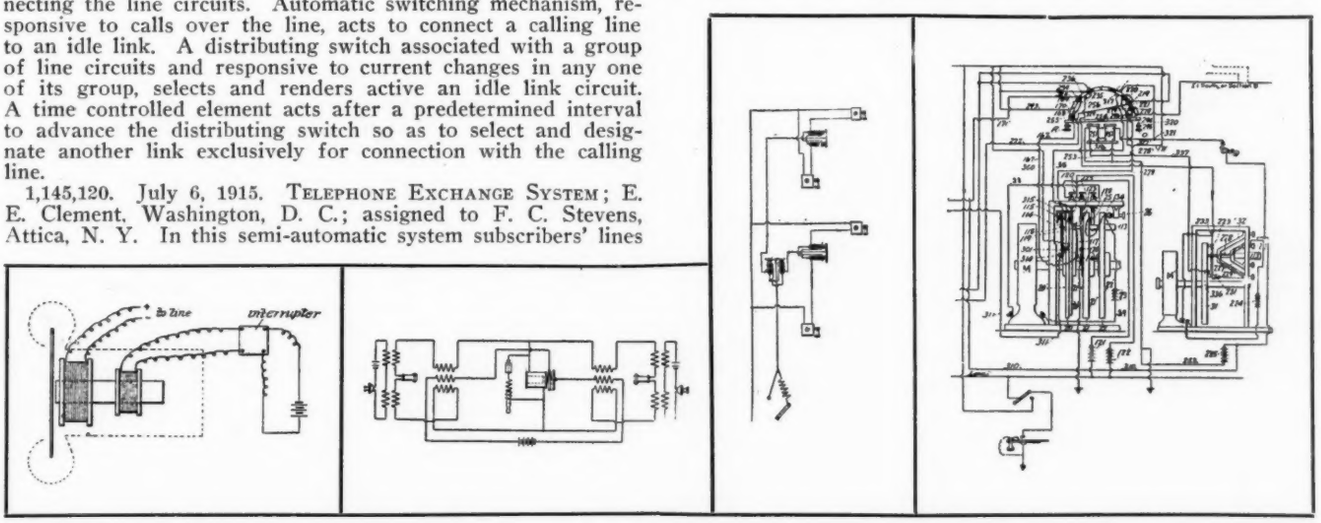
1,145,245. July 6, 1915. TELEPHONE EXCHANGE SYSTEM; M. L. Johnson, Chicago; assigned to the Frank B. Cook Co. Automatic trunking means between A and B boards are described in this patent. Selector switches, associated with the trunks between the two boards, selectively connect with idle operators' recording signaling devices located at the different operators' positions at one of the boards.

1,145,287. July 6, 1915. TELEPHONIC-TELEGRAPH COMMUNICATION FOR RAILROAD TRAINS; F. Arena, New York; assigned one-fourth each to O. Scotto, G. Carpaneto and R. Maggio, New York. Details for making contact with the conductor rails by means of brushes are described in this patent.

1,145,393. July 6, 1915. COOLER FOR TELEPHONE INSTRUMENTS; W. P. Stunz, Lansdowne, Md.; assigned to the Webb Talking Picture Co. The granular carbon chambers of a multi-cell transmitter are each provided with a cooling chamber having partitions arranged to cause a cooling agent to flow in practically a plurality of streams through the chamber, each in circuitous path.

1,145,542. July 6, 1915. AUTOMATIC TELEPHONE SWITCHING APPARATUS; J. G. Blessing, Chicago; assigned to Automatic Electric Co. A calling device for transmitting impulses according to the digits of the called number, is described. It includes a step by step operating arm which controls a continuously rotating arm adapted to follow after the first mentioned arm.

1,145,543. July 6, 1915. IMPULSE TRANSMITTING DEVICE; J. G. Blessing, Chicago; assigned to Automatic Electric Co. This device includes a step by step operating arm, the operation of which is stopped by electromagnetic means.



No. 1,145,554. Sound Indicator. No. 1,145,978. Transmission Circuit. No. 1,147,223. Lockout System. No. 1,145,659. Selecting System.

1,145,544. July 6, 1915. IMPULSE TRANSMITTING DEVICE; J. G. Blessing, Chicago; assigned to Automatic Electric Co. The feature of this impulse transmitting device is a solenoid magnet having a plunger core for intermittently operating a pair of contacts. Means are provided for variably adjusting a movable controlling member whereby the contacts may be operated to transmit a series of impulses.

1,145,554. July 6, 1915. SOUND INDICATOR; F. W. H. Clay, Pittsburgh, Pa. A supplementary vibrating device entirely independent of the source of sound wave vibration is combined with the transmitting or receiving telephone diaphragm. It is adapted to continually maintain the diaphragm in regular vibration with a frequency above the limits of audibility, thus to increase sensibility and suppress noise.

1,145,632. July 6, 1915. MEANS FOR CONTROLLING TELEPHONE CIRCUITS; W. C. Ude, West Haven, Conn. The feature of this patent is the provision of a magnet located in the talking circuit of a telephone set in position to co-act with circuit closing means which are adapted to maintain the circuit normally open. Thus when the talking circuit is left closed by the subscriber, the central operator may open it, placing the set again in a ringing condition.

1,145,659. July 6, 1915. AUTOMATIC SELECTING MULTI-PARTY TELEPHONE SYSTEM; O. Asmussen, Brooklyn, N. Y. In this lockout system, a pulsating selector is provided at each station. Combined with it are switches which assist in setting the station for communication and in locking it out of communication. Relays co-operate with the switches in the setting and cutting out operation. The current supply is controlled by the selector for the actuation of the switches and relays.

1,145,751. July 6, 1915. APPLIANCE FOR TELEPHONE; J. L. Creveling, New York. Details of a supplementary ear piece for a telephone receiver are given. The purpose is to provide for the attachment of another ear piece to be used on the other ear.

1,145,861. July 6, 1915. TELEPHONY; W. W. Dean, Rochester, N. Y.; assigned to Garford Mfg. Co., Elyria, Ohio. A desk stand construction is described. The feature is the attachment of a hollow open tubular portion which extends from the upright standard portion supported by the base. This casing is curved over to present a front at an angle to the standard. The transmitter face is detachably connected to this casing which is so inclined that the mouth of the mouthpiece opens upward. It is known as the bull neck construction.

13,942. (Reissue original patent No. 1,112,291, September 29, 1914.) July 6, 1915. SANITARY MOUTHPIECE; E. M. Jenkins, Italy, Texas. This transmitter mouthpiece consists of a plurality of shells. The inner shell has a threaded portion for attaching to the transmitter. An angular flange extends laterally from the outer end of the inner shell so as to confine and embrace the other shells. This outer shell has provision for storing a disinfectant within it. An intermediate shell has means for admitting the disinfecting fumes from the outer shell, while the inner shell is constructed so as to disseminate the fumes.

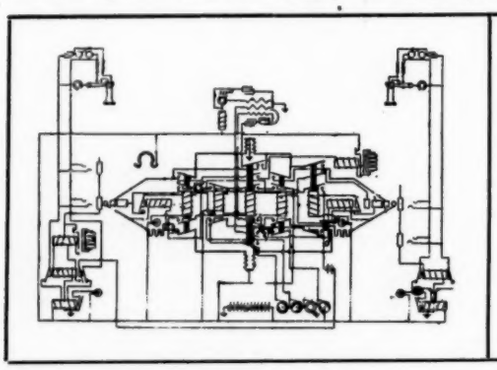
1,145,976. July 13, 1915. SUPERVISORY SYSTEM FOR TELEPHONE LINES; W. W. Dean, Rochester, N. Y.; assigned to Kellogg Switchboard & Supply Co. A supervisory relay associated with a two-wire cord circuit is partially operated, during the connection when the subscriber's telephone is not in use, to operate the supervisory signal. An additional winding of the relay assists in its complete energization and operation to render the supervisory signal inoperative, upon use of the telephone instrument.

1,145,978. July 13, 1915. TELEPHONIC TRANSMISSION CIRCUIT; H. G. Dorsey, East Orange, N. J., assigned to Western Electric Co. A telephonic relay having a natural frequency above the normal maximum telephonic frequencies, is associated with a telephone circuit. Apparatus in a shunt circuit renders the relay relatively less capable of amplifying currents having a frequency equal to its natural period than of amplifying currents of other frequencies.

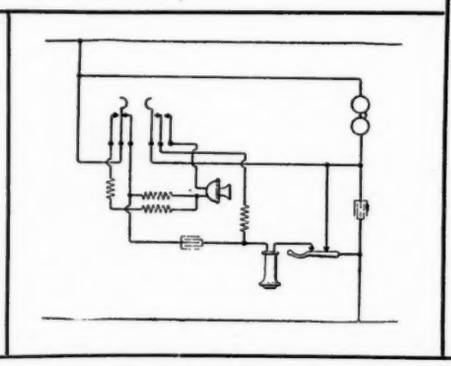
1,146,002. July 13, 1915. TELEPHONE SYSTEM; E. Land, Key West, Fla.; assigned to Kellogg Switchboard & Supply Co. An automatic trunk system is described. An automatic switch is connected to the trunk line and a disconnect circuit is carried serially through contacts of a plurality of trunk jacks connected to the line, and contacts in the automatic switch when the latter is in other than a normal condition. The disconnect circuit is maintained open in the trunk jacks while closed in the switch. It is closed in the jacks upon the withdrawal of a plug from the jacks. There are 116 claims to this patent.

1,146,074. July 13, 1915. TELEPHONE EXCHANGE SYSTEM; M. L. Johnson, Chicago; assigned to the Frank B. Cook Co. Semi-automatic equipment is described. Operator controlled switching apparatus joins operator controlled link connectors with a calling line. Electromagnetically operated selector switches are controlled by the operator as are also electromagnetically operated connector switches.

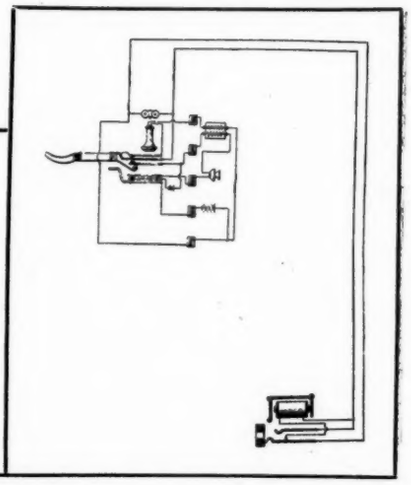
1,146,177. July 13, 1915. TELEPHONE SYSTEM; E. Land, Key West, Fla.; assigned to Kellogg Switchboard & Supply Co. The feature of this system is an automatic selective switch having one movement of selection associated with a jack combined with a connecting plug. It is adapted to select and connect with an idle trunk when the plug is connected with the jack. A trunk terminating in the automatic switch is associated with another automatic selective switch in the same or other office which has two movements of selection. There are 117 claims to this patent.



No. 1,147,347. Service Meter.



No. 1,148,923. Telephone System.



No. 1,148,458. Substation Telephones.

1,146,535. July 13, 1915. SOUND TRANSMITTING MEMBER; L. Steinberger, New York. Receiver construction designed to secure better acoustical properties is described. The receiver casing is articulated and rendered thin at independent points for the purpose of serving as seats of vibratory motion.

1,146,583. July 13, 1915. AUTOMATIC TELEPHONE EXCHANGE SYSTEM; F. R. McBerty, New Rochelle, N. Y.; assigned to Western Electric Co. Registering and controlling equipment at the exchange is provided with means for associating it with a calling line and thereafter preventing interference with the controlling equipment by another line.

1,146,786. July 20, 1915. TELEPHONE SYSTEM; B. M. Davis, Chicago; assigned to Automatic Electric Co. The feature of this system is a substation calling mechanism of the make and break type. A dial determines the degree of operation of the make and break device, which is operated by spring means.

1,146,806. July 20, 1915. BATTERY CASE; R. H. Manson, Elyria, Ohio; assigned to Garford Mfg. Co. Dry cells or batteries of cells are mounted side by side in a casing upon the walls of which are contacts to engage the poles of the battery. Provision is made so that it is impossible to connect the cells or batteries in opposition to each other.

1,146,821. July 20, 1915. SEMI-AUTOMATIC TELEPHONE SYSTEM; M. Schwartz, Chicago; assigned to Automatic Electric Co. Automatic means are provided for maintaining an impulse transmitting device in connection with a plurality of trunk lines. The impulse transmitting device transmits impulses over the trunks to operate automatic switches.

1,146,889. July 20, 1915. TELEPHONE EXCHANGE SYSTEM; F. A. Lundquist, Ingleside, Ill.; assigned to Western Electric Co. The feature of this automatic system is an automatic switch upon which are pairs of multiple connected contact terminals of a telephone line. Trunk terminals are arranged for engagement with the line terminals respectively. Contact operating means cause engagement of the line terminals with the trunk terminals. Provision is made whereby the operating means, after actuation, will be immediately associated with a terminal set wherein are contacts of an idle trunk.

1,147,014. July 20, 1915. AUTOMATIC FIRE ALARM SYSTEM; F. Gottschalk, Stirling, N. J. A self-contained, mechanically actuated device is clamped to the receiver switch hook for moving it to its "on" and "off" position. Mechanical means hold the actuating means, which are released by the melting, by an abnormal heat, of a fusible link which is connected to it.

1,147,025. July 20, 1915. TELEPHONY; M. L. Johnson, Chicago; assigned to the Frank B. Cook Co. This semi-automatic system comprises: A group of link connectors at the exchange adapted to the use of an operator for connecting calling and called lines; signal devices for the link connectors of the group and having controlling electromagnets, and means governed by equipment of the link connectors for causing the signal devices to operate when their link connectors are idle to energize the magnets to restore the signal devices when their link connectors are taken for use.

1,147,223. July 20, 1915. LOCKOUT PARTY LINE TELEPHONE SYSTEM; A. F. Erickson, Seattle, Wash.; assigned one-fourth each to J. V. Boak and G. T. Nonnenbacher, Seattle, Wash. The lockout feature consists of two electromagnets. One lead of the coil of each magnet is in electrical connection with the core of the other electromagnet. An armature for each core is normally disposed retracted therefrom. A contact conducts an electric current through each individual armature only when it is in a normal position.

1,147,246. July 20, 1915. TELEPHONY; M. L. Johnson, Chicago; assigned to the Frank B. Cook Co. In this semi-automatic system a plurality of electromagnetic switches is each individual to one of a group of telephone lines and provided with an electromagnetic switching device for connecting it interchangeably with the lines of the group to which it is individual. Operator controlled means operate a selected electromagnetic switching device to include its associate selected electromagnetic switch in circuit between calling and called lines.

1,147,312. July 20, 1915. TELEPHONE ATTACHMENT; D. J. Daniel, Little Rock, Ark. A sanitary device whereby tape may be drawn across the mouthpiece of a transmitter, is described.

1,147,347. July 20, 1915. SERVICE METER SYSTEM FOR TELEPHONE EXCHANGES; H. S. Turner, San Diego, Cal. In this service meter system a Wheatstone bridge circuit is utilized. A service meter, individual to each of a plurality of substation lines, has a winding connected in the bridge wire of the circuit. Means are provided to energize this winding to cause the meter to record. Automatic means render the meter inoperative when a line is called and render it operative when a call is made and the substation called has responded.

1,147,389. July 20, 1915. AUTOMATIC TELEPHONE SYSTEM; C. L. Goodrum, New York; assigned to Western Electric Co. Describes finder and connector switching mechanisms, each containing terminals for the subscribers' lines. Contact elements co-operate with the mechanisms and operating devices advance them progressively.

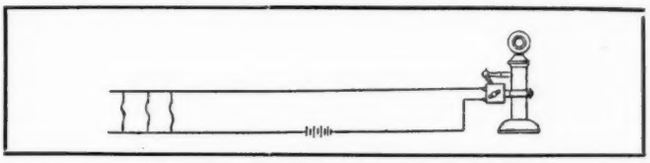
1,147,390. July 20, 1915. SWITCHES AND CIRCUITS FOR AUTOMATIC TELEPHONE EXCHANGES; C. L. Goodrum, New York; assigned to Western Electric Co. The subscribers' circuits are arranged in groups to which is allotted a certain one of a series of switches which are less in number than and common to the subscribers' circuits. Means are operated when a switch is taken for use for extending a starting circuit to an idle switch of the series.

1,147,437. July 20, 1915. SENDING DEVICE; J. N. Reynolds; Greenwich, Conn.; assigned to Western Electric Co. Details of a sending device for an automatic system, which is located at the subscriber's station, are described in this patent.

1,147,716. July 27, 1915. AUTOMATIC TELEPHONY; C. L. Goodrum, New York; assigned to Western Electric Co. Relates to selector and connector switches. A finder switch is associated with each of these switches and its release controls the release of the succeeding switch and its associated finder switch.

1,147,864. July 27, 1915. AUTOMATIC TELEPHONE SYSTEM; D. S. Hulfish, Toronto, Ontario, Canada; assigned to Canadian Independent Telephone Co., Toronto. Details of a switch structure are given. A pair of brushes is movable continuously over a series of fixed contacts. Provision is made for stopping the brushes when a controlling circuit is closed through the first of the brushes and for transferring the controlling circuit to the second of the brushes.

1,147,895. July 27, 1915. TELEPHONE SYSTEM; N. C. Schellenger, Chicago; assigned to Kellogg Switchboard & Supply Co. A two-wire common battery system is described. When connection is made between a cord circuit and a line, the cut-off relay is first energized and is followed by the energization of the supervisory relay. A talking battery supply bridge is provided in which all of the talking current for each line passes through the associated supervisory cut-off relay.



No. 1,148,014. Fire Alarm System.

1,147,928. July 27, 1915. AUTOMATIC TELEPHONE EXCHANGE SYSTEM; H. G. Dietl, Vienna, Austria Hungary; assigned to Western Electric Co. Transmitter current is furnished to each of the lines connected for conversation by means of a pair of relays. Interruption of the current through either of the relays, completes a circuit through a release magnet which effects the release of an automatic switch through which the talking circuit is established.

1,147,997. July 27, 1915. CONVERSATION REGISTERING CIRCUITS FOR MACHINE SWITCHING TELEPHONE SYSTEMS; F. Aldendorff, Mortsel, near Antwerp, Belgium; assigned to Western Electric Co. Electromagnetic means are actuated upon the initiation of a call by one of the parties on a party line for preparing the corresponding meter for operation. The same means also cause the operation of one of the distributing switches to seek a first selector. Provision is made for thereafter closing the meter circuit to actuate the selected meter.

1,148,014. July 27, 1915. FIRE ALARM SYSTEM; F. Gottschalk, Stirling, N. J. This electric alarm system consists of the combination of a desk telephone instrument having a switch hook and a thermostatically operated clockwork mechanism which is mechanically connected with the switch hook. There is no interference with the telephone line circuit as the fire alarm circuit extends no farther than the case containing the clockwork mechanism. A character signal may be transmitted for two or three minutes over the telephone line so that the telephone operator may make a double check before sending the alarm to the fire department. A pawl of the clockwork is released when the armature of the contained magnet is actuated by any approved thermostatic system.

1,148,141. July 27, 1915. TELEPHONE SYSTEM FOR RAILWAY TRAINS; E. H. Boudwin, Philadelphia, Pa.; assigned one-sixth each to D. W. Harner, R. L. Worsing, C. M. Gage, J. A. Pfouts, Philadelphia, and A. E. John, Huntingdon, Pa. This system is designed for providing telephone communication between different parts of a railroad train. Connection between cars is made by bringing the conductors to contact plates in the air brake line coupling member so that the circuit between cars is completed with the coupling of the air brake line.

1,148,218. July 27, 1915. BATTERY TESTER; E. L. Clark, Lakewood, Ohio; assigned to National Carbon Co., Cleveland. This tester is designed for application to battery terminals. It consists of a coil upon a core which is included in a chamber. A plunger in the chamber is adapted to be raised when a predetermined current traverses the coil.

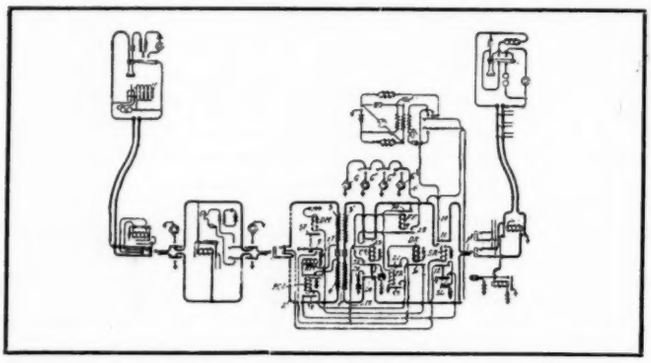
1,148,224. July 27, 1915. BATTERY CONNECTOR; P. J. Fitzgerald, Torrington, Conn.; assigned to the Fitzgerald Mfg. Co., Torrington, Conn. This connector consists of a spring loop, the terminals of which are adapted to engage the binding posts of dry cells by spring pressure. It is designed for connecting one dry cell with another.

1,148,319. July 27, 1915. SELECTIVE SIGNALING SYSTEM; R. M. Hill, New York; assigned to Western Electric Co. Is intended for railway train dispatching. A selectively operated device at each way station controls the operation of a semaphore signal. Means under the joint control of the selectively operated device and the semaphore signal in either of its positions, cause the operation of a reversible code answer back device.

1,148,458. July 27, 1915. SUBSTATION TELEPHONE; O. M. Leich, Genoa, Ill.; assigned to Cracraft, Leich Electric Co. Two sets of batteries are provided at the substation. The actuation of a slow-acting switch hook connects the batteries in series with the line circuit to send a signal during the movement of the switch hook from one limiting position to the

other. In its limiting position, only one of the sets of batteries is connected with the transmitter.

13,959 (Reissue original patent No. 1,104,960. July 28, 1914). July 27, 1915. LIGHTNING ARRESTER; F. S. Chapman, Greensburg, Ind.; assigned to National Electric Specialty Co., Toledo, Ohio. A vacuum type arrester is described. Two line wire



No. 1,149,229. Telephone System.

electrodes and a grounded electrode are placed in a vacuum, with a barrier between the line wire electrodes which supports at one edge the grounded electrode.

1,148,665. August 3, 1915. TELEPHONE SYSTEM; A. H. Dyson, Chicago; assigned to Kellogg Switchboard & Supply Co. A complete automatic system is described. A primary trunk relay and a secondary trunk relay are responsive to the subscriber's calling mechanism. Two conductors extend the trunk circuit connected to the subscriber's line to an automatic switch. Primary and secondary relays for this switch are responsive respectively to currents controlled by the primary and secondary trunk relays. A release magnet for the automatic switch is responsive to currents adapted to be controlled by the trunk circuit after the telephone line is switched for conversation. There are 168 claims to this patent.

1,148,781. August 3, 1915. TELEPHONE SET; P. L. Jensen and E. S. Pridham, Napa, Cal.; assigned to Commercial Wireless & Development Co., San Francisco. A combined receiver and transmitter for wireless telephony is described. The transmitter is mounted upon a movable hollow handle which is connected to the sound box of the receiver of the set by a flexible tube. The hollow handle terminates in an ear piece. Another adjustable hollow arm has an ear piece at one end and the other end is connected to the sound box by a flexible tube.

1,148,787. August 3, 1915. CALLING DEVICE; J. L. McQuarrie, Montclair, N. J.; assignor to Western Electric Co. In this calling device for automatic systems, a manually operated member having finger holes is rotatable in a forward and a backward direction. Guiding means surround the finger holes and have an opening adjacent to a stop toward which the finger holes move in the setting operation.

1,148,792. August 3, 1915. SELF INDUCTION COIL FOR DUPLEX OR MULTIPLEX TELEPHONE CONNECTIONS; A. H. Olsson, and H. B. M. Pleijel, Stockholm, Sweden. This is intended for reducing the magnetic resistance between self induction coils where grouped together. It is accomplished by inserting iron blocks between the iron cores of the coil at the points where the winding halves of the coil meet each other.

1,148,800. August 3, 1915. CURRENT IMPULSE TRANSMITTER; J. G. Roberts, Dobbs Ferry, N. Y.; assigned to Western Electric Co. Details of a code impulse transmitting device for the control of automatic telephone switches are given. A series of impulses, varying in number, may be sent and provision is made for varying the degree of strength of any or all impulses of the combination selected.

1,148,827. August 3, 1915. WIRELESS TELEPHONE TRANSMITTERS; W. Burstyn, Berlin, Germany. A multiple diaphragm condenser connected with the aerial circuit is adapted to be influenced by sound waves in an electric circuit connected with the diaphragm condenser. Electrostatic forces which act upon the condenser and the capacity of the condenser can be varied indirectly by the sound waves.

1,148,912. August 3, 1915. SUBSTATION SENDER CIRCUIT; A. E. Lundell, New York; assigned to Western Electric Co. This substation circuit for automatic telephone systems has in combination with a calling device, the signaling circuit including the primary of an induction coil, and a receiver in series with the secondary of the coil. The signaling circuit is completed by means of the switch hook and a shunt about the receiver is completed when contacts in the shunt are operated by the calling device leaving its normal position.

1,148,923. August 3, 1915. TELEPHONE SYSTEM; J. C. R. Palmer, New Rochelle, N. Y.; assigned to Western Electric Co. A long line battery system is described. A normally open high impedance receiving circuit connected with the telephone line, has a switch provided for closing the circuit. The transmitter circuit is normally open and is provided with means for closing it and simultaneously connecting the high impedance circuit in shunt with it.

1,148,941. August 3, 1915. TELEPHONE RECEIVER; H. P. Wier, Plainfield, N. J.; assigned to Western Electric Co. A receiver for wireless telephony is described. A feature is the means of adjusting the relation of the magnet to the diaphragm.

1,149,229. August 10, 1915. TELEPHONE SYSTEM; R. I. Utter, Chicago; assigned to Kellogg Switchboard & Supply Co. This cord circuit includes a ringing magnet controlled from the incoming end and a disconnect magnet controlled from the outgoing end which have a common contact. A ringing control relay has an energizing circuit that includes the contact and will hold it independent of the ringing magnet. A calling tip relay controls the disconnect magnet which in turn restores the contact.

1,149,614. August 10, 1915. TOLL TELEPHONE SYSTEM: E. P. Baird, Evanston, Ill.; assigned to Baird Mfg. Co., Chicago. This toll device at the substation is operated independent of the central office operator. A switch is provided at the substation and is held normally in position to close the line. When the switch is in one position, the transmitter is rendered inoperative for speech transmission. The toll device controls the operation of this switch.

Legal Cases and Decisions

By A. H. McMillan

Removal of Telephone Pole.

The city of Dallas, Texas, brought suit against the Southwestern Telegraph & Telephone Co. to recover an annual privilege fee on poles in its streets. The city has passed an ordinance fixing the amount required to be paid by telephone and other electric companies for the privilege of using with their poles, wires and conduits, the streets and alleys of the city. It was under this ordinance that the suit was brought. The company contended that the city did not have power to levy the charges sued for in the case, but the court held that the authority given the city by its charter to regulate the use of its streets and to remove therefrom telephone poles, includes authority to charge the telephone company for use and occupation of its streets with poles. The company further contended that the provisions of the ordinance were discriminatory and denied to it the equal protection of the laws as provided by the constitution.

The ordinance required all companies using or maintaining poles in the city to pay an annual privilege fee of $2 per pole but excepted poles of street car companies and of companies which by their franchises are required to pay the city a percentage of the receipts of their business. The court held that the ordinance was not unconstitutional because the classification was reasonable and just. The court held that the company must by proper evidence make known the number of poles used by it for its long distance wires so that they might be excepted from the poles covered by the ordinance. The franchise fee was held to be not unreasonable. Southwestern Telegraph & Telephone Co. vs. City of Dallas, 174 Southwestern, 636.

Municipal Telephone Exchange.

Suit was brought to enjoin the city of Mitchell, from issuing bonds for and contracting for the construction of, and from operating or attempting to operate a telephone exchange in the city. The proposed action was about to be taken by the city under the statute of the state authorizing cities to acquire, construct, equip and operate a telephone system. The plaintiff contended that the statute was in violation of the constitution of the state, declaring that

neither counties nor states nor municipalities shall loan its credit in the aid of individual corporations or become the owner of capital stock of any such corporation, nor shall the state engage in any work of internal improvement.

The court held that this contention was not sound, for the constitution merely prohibits cities from becoming interested in public utilities owned by private persons. The court also held that bonds might be issued though the majority of votes cast at the election in favor of the issuance was not a majority of the entire voters of the city. Spangler vs. City of Mitchell, 152 Northwestern, 339.

Indemnity Against Loss.

In a suit against an electric company for personal injury, caused by its alleged negligence in the maintenance and operation of one of its wires, it is prejudicial error for the judge to admit evidence over the objection of the company tending to prove that the company carried insurance indemnifying it against loss by accident for the purpose of establishing negligence. The circumstances of the suit were as follows:

A man was driving a team along a narrow public road, walking beside his horses. As he was going up a hill he stopped to rest his team, and, seeing the end of a broken telephone wire lying across the ditch and extending into the roadway, and thinking it might become entangled in the wheels of his wagon, and supposing it to be otherwise harmless, he stooped and took hold of it to toss it out of the road. It proved to be highly charged with electricity and so overcame him that he was unable to release himself from it. The plaintiff, who was nearby, seeing the man's perilous situation, ran to his assistance, and in his efforts to get the wire out of the man's hand, came in contact with it himself and was injured.

A judgment for the plaintiff was reversed on account of the error in the admission of evidence but it was held to be negligence for an electric company to suffer a broken telephone wire, even though not owned by it, to fall across its electric wire upon the highway and remain there as a menace to the public for an unreasonable time. Walter vs. Appalachian Power Co., 84 Southeastern, 617.

Installation of Wires.

An electric light company maintaining heavily charged wires 29 feet from the ground and 12 feet from the building, cannot reasonably be held to anticipate that the janitor of the building in hoisting a flag on a pole with a copper wire will so manipulate the wire from his position on the ground as to bring it in contact with the electric wires, thereby causing his death. So held the Supreme Court of Pennsylvania in a recently decided case.

The suit was brought by the wife of the janitor to recover damages for his death. In raising the flag the wire, when it reached the top of the pole, became entangled in some way and in trying to loosen it the janitor shook it until it evidently came in contact with an overhead electric wire. The negligence alleged against the electric company was that its wire, which was charged with a powerful current of electricity, was not properly insulated and so not in good repair. A judgment for the plaintiff was reversed. Garoski vs. Alleghany County Light Co., 93 Atlantic, 338.

Troubles in a Mutual Company.

A member of a mutual telephone company charged that the operator of the company refused him the services due him unless he would pay an excessive and unauthorized charge, which refusal he alleged, damaged him in his business in the sum of $1,000. It appeared, however, that the amount in controversy did not exceed $5.40, by paying which the plaintiff could have obtained the connection he desired. It was held that the complaint did not state an appealable cause of action. The suit also involved a statement made to the plaintiff in the presence of others as follows: "All I want you to do is to pay your honest debts." This statement was held not to be slanderous although the plaintiff was seeking to obtain damages for slander on account of such statement. Hamilton vs. McKenna, 147 Pacific, 1126.

An Intrastate Transaction.

A telegram was sent from one state to a point in an adjoining state to which there was no direct telephone line. The nearest point, however, was connected with the place of destination by telephone. The telegraph company, as agent for the sender, attempted to telephone the message. It was held that the telephoning of the message was a purely intrastate transaction, and the telegraph company's liability for negligence in that particular was covered by the law of the state of the destination of the message. Young vs. Western Union Telegraph Company, 84 Southeastern, 55.

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

Personal.

L. H. Von Dollen has been made manager of the Oakland, Lyons and Decatur exchanges of the Nebraska Telephone Co.

Ben C. Moulden, for the past year manager of the Texas Telephone Co., at Waco, Texas, was recently married to Miss Eddie Mai Riggins, also of Waco.

Henry Enoch, of Wichita, Kan., has been appointed plant superintendent of the Missouri & Kansas Telephone Co., at Hutchinson, Kan., succeeding C. A. Gordon, resigned.

C. V. Mendenhall has resigned his position as manager of the Bluffton, Ind., exchange of the United Telephone Co. Eli Coats, commercial agent at Marion, Ind., will succeed him.

Arthur Guest, for the past three years employed as bookkeeper for the Rochelle Trust & Savings Bank, has been appointed office manager of the Rock River Telephone Co., at Rochelle, Ill., succeeding Miss Nellie Bird who has resigned.

W. H. Lynch, for the past year connected with the Consolidated Telephone Co., at Hazelton, Pa., has been promoted to the position of district superintendent, with headquarters at Olyphant. Mr. Lynch will have charge of both the Peckville and Olyphant exchanges.

J. E. Peck has purchased the controlling interest in the Schuyler Telephone Co., at Rushville, Ill., and the company has been re-organized. The company controls practically all the country lines entering Rushville. The Schuyler company also has purchased the Grange Telephone Co., taking over its lines and franchise.

Minor H. Day has purchased the Delaware Mutual Telephone Co., at Lansing, Kan., from S. E. Parisa and G. L. Lamb, and will assume active charge of the plant. For 18 years Mr. Day was associated with the Missouri & Kansas Telephone Co., as wire chief, and for three years he was connected with the Suburban Telephone Co., at Tonganoxie, Kan.

F. W. Kesseler, local manager of the Valley Home Telephone Co., at Bay City, Mich., for the past eight years, has been promoted to the position of commercial agent with headquarters in Bay City. His new duties will include general extension and commercial work in the counties of Bay, Saginaw, Tuscola, Genesee and Huron. J. S. McIntosh, of Bay City, will succeed Mr. Kesseler.

Louis P. Wells, formerly manager of the Houston Home Telephone Co., of Houston, Texas, and now connected with the Southwestern Telegraph & Telephone Co. in that city, was injured in the Gulf storm which swept over Houston on August 19. The roof was blown off of Mr. Wells' home in Park Place, a suburb of Houston, and he was caught under falling timbers, sustaining painful injuries.

A. H. Krom, of Chicago, formerly electrical engineer in the city department of gas and electricity, has been appointed assistant telephone engineer, on the staff of the Illinois Public Utilities Commission. Mr. Krom is a graduate of the Electrical Engineering Department of Purdue University, with the degree of bachelor of science and has been active in Chicago engineering circles since his graduation in 1910. His most recent work of particular note has been in connection with the organization of the American Association of Engineers, recently formed in

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Chicago, having a national scope, devoted to the improvement of condition in the engineering field. Mr. Krom is chairman of the membership committee of the association.

CAMERON L. BAER, manager of the Cumberland Valley Telephone Co., Harrisburg, Pa., Mrs. Baer and Miss Baer have just completed a most delightful trip through the Golden State. They visited the expositions at San Francisco and San Diego and made a brief stay in Los Angeles looking over the California bungalow district. They went out to the great movie plant, "Universal City," where they witnessed a real human screen act. Mr. Baer and family returned via the Southern route, El Paso, New Orleans and Atlanta, Ga.

MISS DAISY FLORENCE, chief operator of the Cynthiana Telephone Co., Cynthiana, Ky., was recently united in marriage to W. Trimm, of Steubenville, Ohio. Mrs. Trimm began her career in the telephone business in 1912, as a local operator at Cynthiana. In September, 1913, she was promoted to toll operator and in August, 1914, was made chief operator at the Cynthiana exchange. Her operating room was acknowledged to be the quietest in the Central Home Telephone & Telegraph Co.'s system and the efficiency of her operators was always rated high. Mr. and Mrs. Trimm will make their home in Steubenville, where Mr. Trimm is in business.

Obituary.

MICHAEL P. MORAN, manager of the telephone exchange at Decorah, Iowa, died at his home there August 6, at the age of 50 years.

THOMAS J. KEECH, for 24 years manager of the Michigan State Telephone Co., at Ann Arbor, Mich., died recently of paralysis at the age of 78 years.

New Companies and Incorporations.

GANGES, MICH.—The Western Allegan County Telephone Co. has been incorporated with a capital stock of $2,000. The incorporators are Alice E. Dunn, E H. Atwater, J. H. Crane, C. B. Welch, and Theo. Wade.

WARBA, MINN.—The Warba Telephone Co. has been organized. The officers are: W. P. Hicken, president; Mathew Rosholt, vice-president; Chas. Butterfield, secretary; and R. W. Hawkins, treasurer.

COLLINSVILLE, OKLA.—The Eureka Rural Telephone Co. has been formed with a capital stock of $550. The incorporators are Geo. Esau, W. F. Just and H. L. Louven.

ROSLYN, SO. DAK.—The Roslyn Mutual Telephone Co. has been incorporated with a capital stock of $10,000. The incorporators are S. J. Reed, A. O. Hagen, and P. O. Floren.

AFTON, TEXAS.—The Afton Telephone Co. has been incorporated with a capital stock of $1,650. The incorporators are B. F. Yeates, W. R. Stafford, and R. M. Hornly.

CHRISTIANA, TENN.—The Christiana Telephone Co. has been formed with a capital stock of $1,000. The incorporators are H. H. Clark, A. N. Miller, N. D. Ellis, W. T. Gentry, and G. W. Smotherman.

OAK RIDGE, VA.—The Oak Ridge Telephone Co. has been incorporated with a capital stock of $5,000. C. H. Yates is president, and R. B. Carruthers is secretary-treasurer.

THORP, WIS.—The Thorp Telephone Co. has been incorporated with a capital stock of $25,000. The incorporators are M. Lund, L. A. Lund, C. A. Lund, J. E. Lund and V. M. Lund.

TEN SLEEP, WYO.—The Ten Sleep & Big Trails Telephone Co. has been incorporated with a capital stock of $1,500. The incorporators are Milo Burke, W. H. Small, and W. S. Fiscus.

Construction.

ATLANTA, GA.—The Cumberland Telephone & Telegraph Co. is reported to have authorized an appropriation for enlarging its underground conduit system.

ELDORADO, KANS.—The Butler County Telephone & Electric Co. will build a new office.

NORMAN, OKLA.—The Norman Telephone Co. will spend approximately $2,000 in placing its telephone wires underground.

CLEARFIELD, PA.—The Huntingdon & Clearfield Telephone Co. will repair or rebuild its entire telephone system in Cambria county.

MEYERSDALE, PA.—The Economy Telephone Stock Co. will soon extend its lines into Confluence and Ursina.

Financial.

ST. MATTHEWS, S. C.—The Orangeburg-St. Matthews Telephone Co. has declared a dividend of 10 per cent.